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HS–013 096 – HS–013 170
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HS–820 212; 280

Shelve in Stacks
S.B.T.

U.S. Department of Transportation
National Highway Traffic Safety Administration

Highway Safety Literature

. . . A SEMI-MONTHLY ABSTRACT JOURNAL

73-18

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A document containing several articles is announced as complete volume under an HS number referring to it as a whole. Entries for individual articles are listed under their own HS numbers.

SAMPLE ENTRIES

JOURNAL ENTRY

Title of Document

SYNTHESIS OF CASE LAW JURISPRUDENCE RELATING TO WET-WEATHER HIGHWAY CONDITIONS

Journal Citation

Highway Research Record n 376 p29-36 (1971)

Author(s)

D. C. Oliver 1971

Sponsored by Highway Res. Board Steering Com. for Workshop on Anti-Skid Program Management and presented at the workshop.

Search Terms

Descriptors: *Liability, *Negligence, *Accident responsibility, *Legal responsibility, *Wet road conditions, *Court decisions, *State government, *Skidding accidents, *Warning signs, *Highway maintenance, *Litigation, *Icy road conditions,

Abstract

The extant case law on legal liability for accidents occurring on icy and wet highways has established three central areas and one subarea in the jurisprudence of maintenance liability. These areas are compliance with general duties in order to escape liability; damages resulting from noncompliance (negligence); contributory negligence as a bar to recovery; and advisory signing as a technique in meeting general duties. Court decisions covering these four areas are presented.

NHTSA Accession Number

HS-012 289

*Subject heading in Subject Index

CONTRACT REPORT

EQUIPMENT AND PROCEDURES FOR MEASURING GLARE FOR MOTOR VEHICLES. FINAL REPORT

Corporate author

Teledyne Brown Engineering

N. E. ChattertonJ. D. HayesE. W. George 1972 102p

Contract DOT-HS-089-1-139

Availability

NTIS

Descriptors: *Glare, *Glare reduction, *Visual perception, *Photometers, *Luminance, *Hydraulic equipment, *Central vision, *Field of view, *Backgrounds, *Contrast, *Light conditions, *Brightness, *Test facilities, *Test equipment, *Vehicle safety standards, *Simulators, *Light, *Reflectance, *Measuring instruments,

A procedure and description of equipment for measuring glare from a driver's own vehicle are presented. The procedures are based on a disability glare theory as applied to foveal vision. Two pieces of apparatus were constructed to provide the measurement capability. One of them simulates diffuse sky glare and the other simulates direct solar glare. Methods of combining data from these measurements are presented along with scaling laws selected to provide a value for glare as it would be under natural daylight conditions. A standard for allowable glare levels from the vehicle is developed which is independent of the measurement procedure. Test results from a passenger car are presented and compared with this standard. Recommendations for improvements to the apparatus and additional research requirements for improvement to the theory are made.

HS-800 731

*Subject he[redacted]

1. ACCIDENTS

1A. Emergency Services

AN EVALUATION METHODOLOGY FOR EMERGENCY MEDICAL SERVICES (EMS) SYSTEMS

Computer Sciences Corp.

Contract DOT-HS-134-2-460
Report for Jul 1972-Feb 1973.
NTIS

*Emergency medical services, *Program evaluation, *Emergency reporting systems, *Emergency vehicles, *Ambulance personnel training, *Data acquisition, *Personnel, *Data analysis, *Field tests, *Multidisciplinary teams, *Transportation of injured, *Medical treatment, *Data processing, *Questionnaires, *Matrix reduction, *Emergency equipment, *North Atlantic Treaty Organization,

Methodology for the evaluation of Emergency Medical Services (EMS) systems was developed using a baseline questionnaire developed under the North Atlantic Treaty Organization (NATO). This was refined, expanded, and field tested in several states with the intention that, under NATO, it might become an international standard for EMS assessment. The survey guide is included and covers EMS organization, personnel, equipment, operational procedures and records and statistics. The evaluation summary sheet, which is also included, provides a flexible evaluation system based on a two-dimensional matrix concept. In addition to being able to arrive at an overall effectiveness index for the entire system, it is possible to obtain effectiveness indexes separately for each major element and subelement and for each effectiveness parameter. Specific strengths and deficiencies can be pinpointed and quantitatively compared with those of other systems. A sample evaluation is presented.
HS-800 866

BASIC TRAINING PROGRAM FOR EMERGENCY MEDICAL TECHNICIAN--AMBULANCE, CONCEPTS AND RECOMMENDATIONS. FINAL REPORT

Dunlap and Associates, Inc.
J. T. FucignaA. ClevenR. D. Pepler
Contract FH-11-6967
NTIS

*Ambulance personnel training, *Emergency medical services, *Curricula, *Instructor training,

The main objective of this project was to develop and pilot test a basic course for ambulance personnel with emphasis on the medical aspects of training. This included the identification of a medically acceptable text or manual for use as part of the course, the prerequisites for selecting students, and the qualifications of instructors. The concept of emergency medical technician as a new paramedical career is described and the course and the format and content of the related Instructor's Lesson Plans and Course Guide are summarized. Requirements for additional training courses and the need to develop a program for instructors are discussed and recommendations on steps that could be taken to assist in upgrading the performance and status of ambulance personnel are presented. Course and lesson objectives are included.
HS-800 878

1B. Injuries

AN ANALYSIS OF THE RELATIONSHIP BETWEEN DRIVER INJURY AND VEHICLE AGE FOR AUTOMOBILES INVOLVED IN NORTH CAROLINA ACCIDENTS DURING 1966-1970

North Carolina Univ. Hwy. Safety Res. Center
G. G. KochD. W. Reinfurt
Supported in part by the North Carolina Governor's Hwy. Safety Program.
Corporate author

*Injuries by vehicle age, *Driver injuries, *Injury severity, *North Carolina, *Accident risks, *Automobile models, *Chi square test, *Linear regression analysis, *Mathematical models, *Chevrolets,

It has been hypothesized that automobile age is an important factor with respect to injury severity. To investigate this hypothesis, injuries to unbelted drivers in accidents in North Carolina during 1966-1970 were examined for six makes of 1960-1966 cars. Injury severity for a given make and model year combination for accidents in a given year was compared with the aggregate for that same make and model after adjusting for accident type, impact site, and traveling speed prior to the crash. The procedure calculates an expected frequency (m) of serious injuries based on the aggregate and compares it with the observed frequency (n) for each accident year using an appropriate chi square test. A linear regression model was used to determine if there was a trend over accident years in the values of the ratios, R equals n/m. The results indicate that the vehicle deterioration hypothesis does not apply to these North Carolina accident data.
HS-013 115

VEHICLE DAMAGE SCALE FOR TRAFFIC ACCIDENT INVESTIGATORS: AN INVESTIGATION OF ITS USE AND POTENTIAL FOR PREDICTING DRIVER INJURY

North Carolina Univ. Hwy. Safety Res. Center
For primary bibliographic entry see Fld. 1C.
HS-013 118

1C. Investigation And Records

MOTOR CARRIER ACCIDENT INVESTIGATION. TRIANGLE PACIFIC CABINETS, INC. ACCIDENT--FEBRUARY 22, 1972--HUBBARD, OHIO

Bureau of Motor Carrier Safety
72-6
Corporate author

*Accident case reports, *Accident investigation, *Truck accidents, *Loss of control caused accidents, *Medical factor caused accidents, *Ohio, *Tractor semitrailers, *Driver fatalities, *Property damage accidents, *Driver physical fitness, *Fatality causes, *Cardiovascular diseases, *Accident factors,

On February 22, 1972, at 5:40 p.m. a tractor semitrailer, westbound on Insterstate 80, gradually ran off the left side of the road, crashed through a guardrail, and plunged down an embankment, colliding with a bridge support. The truck driver was fatally injured and the property damage amounted to $25,500.

The observations and conclusions of a coroner, the statement of a witness, and the results of an autopsy indicate that this accident was caused by a physically incapacitated truckdriver who lost control of his vehicle; The driver had been suffering from a serious cardiovascular disorder.
HS-013 100

MOTOR CARRIER ACCIDENT INVESTIGATION. CONSOLIDATED FREIGHTWAYS CORPORATION ACCIDENT-- NOVEMBER 18, 1972--PORTLAND, OREGON

Bureau of Motor Carrier Safety
72-5
Corporate author

*Accident case reports, *Accident investigation, *Truck accidents, *Vehicle barrier collisions, *Fatality causes, *Ejection, *Seat belt usage, *Accident location, *Driver experience, *Driver records, *Portland (Oregon), *Weather caused accidents, *Wet road conditions, *Rain, *High speed caused accidents, *Loss of control caused accidents,

At 1:30 a.m. in heavy rain a truck traveling 50 mph swerved out of control to avoid a stopped vehicle, struck the right guardrail, crossed the road and struck and skidded along the concrete retaining wall, veered back into the guardrail, and swerved back into the retaining wall. The driver was ejected through the left door which had opened and was subsequently run over by his own vehicle. The primary cause of this accident was a truckdriver who, despite over 19 years of commercial driving experience and an excellent driving record, failed to reduce the speed of his vehicle in inclement weather and failed to use a seatbelt. The collision impacts were not severe enough to inflict serious injury upon the driver had he been able to remain in his vehicle.
HS-013 101

MOTOR CARRIER ACCIDENT INVESTIGATION. O'NAN TRANSFER COMPANY ACCIDENT-- SEPTEMBER 28, 1972--JONESBORO, TENNESSEE

Bureau of Motor Carrier Safety
72-4
Corporate author

*Accident investigation, *Accident case reports, *Truck accidents, *Multiple vehicle accidents, *Head on collisions, *Tennessee, *Accident causes, *Driver intoxication, *Fatalities, *Injuries, *Property damage accidents, *Driver records,

A westbound tractor semitrailer traveling at a speed of 55-60 mph swerved into the opposing lane and struck a car head on. The car was shoved backwards at an angle and was struck broadside by a pickup truck following. The car and truck came to rest off the highway. The tractor semitrailer skidded for a distance of 150 feet and overturned on its right side, then slid for an additional 48 feet before coming to rest blocking the roadway. The accident resulted in five fatalities, two injuries, and $22,500 property damage. The cause of this accident was determined to be the intoxicated condition of the truck driver, which reduced his capability to operate his vehicle in a safe manner.
HS-013 102

VEHICLE DAMAGE SCALE FOR TRAFFIC ACCIDENT INVESTIGATORS: AN INVESTIGATION OF ITS USE AND POTENTIAL FOR PREDICTING DRIVER INJURY

North Carolina Univ. Hwy. Safety Res. Center
F. J. Vilardo
Corporate author

*Injury prediction from vehicle damage, *Damage severity index, *Injury severity, *Driver injuries, *Accident reports, *Accident investigation, *State action, *North Carolina, *Variance analysis, *Correlation analysis, *Accident types,

The degree to which a state highway patrol unit would report valid Traffic Accident Data Project Vehicle Damage Scale (TAD) vehicle damage ratings and the relationship between TAD severity ratings and degree of driver injury were investigated The North Carolina State Highway Patrol began using the TAD scale on April 1, 1971. The reports covering April through September 1971 comprised the data for this study. It was found that 93% of the accident reports involving passenger cars had an acceptable TAD rating. These ratings correlated .45 with degree of driver injuries--higher than any other item routinely collected. The degree of multiple correlation between a selected number of variables with and without TAD was also compared. The degree of multiple correlation without TAD was .10. This was increased to .26 when TAD was added to the variable set. It was concluded that the TAD scale is a useful estimate of crash severity as well as a control variable in future research.
HS-013 118

MOTORCYCLE FACTS

National Safety Council

Corporate author

*Motorcycle accidents, *Motor scooter accidents, *Accident rates, *Accident factors, *Motorcycle safety, *Accident statistics, *Motorcycle operator fatalities, *Motorcycle passenger fatalities, *Accident severity, *Accident types, *Impact angle, *Accident causes, *Time of accidents, *Environmental factors, *Motorcycle operator experience, *Motorcycle operators, *Injuries by body area, *Motorcycle laws, *Motorcycle characteristics,

In 1971 motorcycles represented 3.7% of all vehicles involved in fatal accidents. Deaths of operators and passengers of motorcycles totalled 2,410. Based on reports from 22 state traffic authorities, motorcycle accident data including motorcycle rider fatalities, accident severity, accident types, directional analysis, accident causes, time of accidents, environmental factors, motorcycle rider characteristics, motorcycle operator experience, injuries, motorcycle characteristics, and motorcycle legislation are presented. Recommendations for safe motorcycle operation are included.
HS-013 129

SUMMARY OF ACCIDENT INVESTIGATION 1971

Bureau of Motor Carrier Safety

Corporate author

*Accident investigation, *Accident analysis, *Accident case reports, *Accident statistics, *Truck accidents, *Bus accidents, *Accident causes, *Injury statistics, *Fatality rates, *Head on collisions, *Rear end collisions, *Multiple vehicle accidents, *Vehicle vehicle collisions, *Side impact collisions, *Single vehicle accidents, *Railroad grade crossing accidents, *Skidding accidents, *Loss of control caused accidents, *Bridge failures, *Explosions, *Fires, *Transportation of hazardous materials, *Annual reports, *Truck defects, *Bus defects, *Driver experience, *Ejection, *Driver records, *Time of day, *Accident location, *Property damage accidents, *Damage costs, *Driver physical fitness, *Weather,

This annual report represents an analysis of 291 accidents resulting in 396 fatalities, 957 injuries, and $9,497,185 property damage. While the report contains extensive data and numerous comparisons with respect to accident conditions, vehicle equipment, hazardous cargoes, personnel, and environmental factors, unqualified statistical comparisons on an industry-wide basis, such as comparing these data with other data on total vehicles, mileage, drivers, or with experience of prior years are not recommended. Accident report summaries are included.
HS-013 143

DEVELOPMENT OF A TRAFFIC ACCIDENT ANALYSIS SYSTEM. FINAL REPORT

Georgia State Hwy
3RD., R. A. Graves3rd. , R. HodgesPB-212 082
Prepared in cooperation with Federal Hwy. Administration
NTIS

*Accident analysis, *Highway Safety Act of 1966, *State laws, *Highway safety programs, *Accident location, *Traffic records, *Highway safety standards, *Federal role, *Georgia, *Accident statistics, *Fatality rates, *Vehicle mileage, *Data processing, *State action, *Severity indexes, *Point systems, *Accident report forms, *Benefit costs analysis, *Accident risk forecasting, *Accident rates, *Program evaluation, *California, *Florida, *North Carolina, *Mathematical analysis, *Questionnaires, *Data acquisition,

A study of the collection and use of traffic accident data by highway agencies in states other than Georgia was conducted through the use of a survey questionnaire sent to state highway agencies, a literature search, and visits to state highway agencies in California, Florida, and North Carolina. A historical sketch of the legislation leading to the organizational structure of the State administrative structure for coordinating highway safety programs and the policy of the Federal Highway Administration for qualifying for Federal-aid for safety improvements are presented. The data base availabel to the Georgia Highway Department was examined, and recommendations are made for improved data collection and analysis procedures and for data elements collected. The recommendations are divided into those which could be implemented in the near future, and those which are envisioned to be considered for implementation in four or five years.
HS-013 151

CONSTRUCTION ZONE, DETOUR AND TEMPORARY CONNECTION ACCIDENTS. FINAL REPORT

California Div. of Highways
For primary bibliographic entry see Fld. 2D.
HS-013 152

FATAL HIGHWAY ACCIDENTS IN FEDERAL HIGHWAY ADMINISTRATION, REGION 8, APRIL 1969-MARCH 1970

Federal Hwy. Administration
For primary bibliographic entry see Fld. 1E.
HS-013 155

STUDY TO DETERMINE THE RELATIONSHIP BETWEEN VEHICLE DEFECTS AND FAILURES, AND VEHICLE CRASHES. VOL. 1. FINAL REPORT

Indiana Univ.
DOT-HS-034-2-263-VDP
Contract DOT-HS-034-2-263
Report for 1 Jul 1970-31 Aug 1972.
NTIS

*Trilevel accident investigation, *Accident causes, *Multidisciplinary teams, *Accident analysis, *Defects, *Human factors, *Indiana, *Environmental factors, *Failure caused accidents, *Accident factors, *Precrash phase, *Data acquisition, *Data processing, *Data analysis, *Computer programs, *Statistical analysis, *Accident rates, *Accident severity, *Driver error caused accidents, *Driver behavior, *Driver errors, *Perception, *Decision making, *Driver physical fitness, *Driver mental fitness, *Driver experience, *Driver intoxication, *Psychological factors, *Brake failures, *Tire failures, *Steering system failures, *Highway characteristics, *Flow charts, *Data reduction, *Coding systems,

Results of a Trilevel Accident Investigation Program based on 999 accidents investigated on the on-site level, and 219 accidents investigated on the multidisciplinary level are reported. The study focused on the statistical determination of the relative roles played by human environmental, and vehicular deficiencies in causing automobile accidents. The study was based in Monroe County, Indiana. Data analysis procedures are summarized and the findings regarding precrash accident causes are emphasized. Human factors were implicated by far the most frequently; vehicular factors were implicated least frequently; and environmental factors were implicated to an intermediate extent.
HS-800 850

MULTIDISCIPLINARY ACCIDENT INVESTIGATION TEAM--BOSTON UNIVERSITY. FINAL REPORT

Boston Univ.
COORDINATOR , H. M. RobinsonFR-4
Contract FH-11-7402
Report for 1 Sep 1970-30 Sep 1971.
NTIS

*Accident investigation, *Accident causes, *Multidisciplinary teams, *Accident analysis, *Accident case reports, *Accident diagrams, *Fatality causes, *Injury causes, *Occupant kinematics, *Vehicle safety standards, *Safety program effectiveness, *Accident statistics, *Time of accidents, *Accident location, *Autopsies, *Toxicology, *Precrash phase, *Crash phase, *Postcrash phase, *Accident types, *Environmental factors, *Age factor in accidents, *Accidents by vehicle age, *Accidents by vehicle make, *Blood alcohol levels, *Restraint system usage, *Human factors, *Highway improvements, *Boston,

Findings of multidisciplinary investigations of 22 fatal automobile accidents occurring in the Boston area from September 1,

1970 through September 30, 1971 are presented. A brief description of investigation methodology is given; accident trends are discussed; and federal vehicle safety standards are evaluated. A case summary and collision diagram for each of the 22 cases in included.
HS-800 857

THE EFFECTIVENESS OF HEAD RESTRAINTS IN REAR END IMPACTS. FINAL REPORT

Rochester Univ.
For primary bibliographic entry see Fld. 5N.
HS-800 877

1D. Locations

TRAFFIC ACCIDENTS--THE UNCOMMON COMMON EVENTS PROBLEM

For primary bibliographic entry see Fld. 3D.
HS-013 122

DEVELOPMENT OF A TRAFFIC ACCIDENT ANALYSIS SYSTEM. FINAL REPORT

Georgia State Hwy
For primary bibliographic entry see Fld. 1C.
HS-013 151

2. HIGHWAY SAFETY

A STUDY OF ACCIDENT RATES IN DEVELOPING COUNTRIES

Transport and Road Res. Lab. (England)
G. D, JacobsP. Hutchinson TRRL-LR-546
Corporate author

*Accident statistics, *Developing countries, *Injury rates, *Fatality rates, *Statistical analysis, *Injury severity index, *Injury statistics, *Automobile population, *Vehicle registration, *Motorcycles, *Medical institutions,

Using published data a study was made of changes in accident rates with time in a number of developing countries and it was found that in almost all the countries there is a continuing downward trend in fatality and injury rates per vehicle, Kenya and Zambia being notable exceptions. Fatality rates were found to be related to vehicle ownership levels: the lower the vehicle ownership level, the higher the fatality rate per vehicle. The severity index, a measure of the number of fatalities as a proportion of total casualties, was also found to be correlated with vehicle ownership levels: the lower the vehicle ownership level, the higher the severity index. A further examination of the severity index showed that it was closely affected by the extent of medical facilities in these countries. There was also some evidence that it was related to the proportion of motorcycles in each country.
HS-013 121

ANALYSIS OF CHILD TRAFFIC ACCIDENTS YEAR 1972.

Detroit Police Dept. Traf. Safety Bureau
J. Logan
Cover title: The Child in Detroit Traffic.
Corporate author

*Accident statistics, *Accident analysis, *Children, *Detroit, *Pedestrian accidents, *Bicycle accidents, *Child pedestrians, *Accident location, *Accident causes, *Time of accidents, *Time of day, *Day of week, *Age factor in accidents, *Sex factor in accidents, *Child injuries, *Child fatalities, *Pedestrian behavior, *Bicycle rider behavior, *Injuries by age, *Pedestrian fatalities, *Bicycle rider fatalities, *Passenger fatalities,

This analysis was compiled for the purpose of determining the major causes of child traffic injury and fatal accidents. This report covers actions of child pedestrians and bike and mini-bike riders injured or killed in traffic; time of day and day of week of child accidents; location of accident; accidents by age group; accidents by precinct; analysis of accidents occurring while child was going to or from school; and school attending (public or parochial). Of all pedestrians injured in Detroit in 1972, 36.3% were children of school age. Of child pedestrians and bike riders injured, 64.9% were boys and 35.1% were girls; Of 5,047 children injured in Detroit traffic, 72.8% were passengers in vehicles. The most dangerous period of the day was 3:00 to 7:00 P.M. and the most dangerous days were Thursday and Friday.
HS-013 142

FATAL HIGHWAY ACCIDENTS IN FEDERAL HIGHWAY ADMINISTRATION, REGION 8, APRIL 1969-MARCH 1970

Federal Hwy. Administration
H. R. Hosea PB-212 847
NTIS

*Accident statistics, *Accident analysis, *Fatalities, *Accident factors, *Accident rates, *Accident types, *Urban accidents, *Rural accidents, *Alaska, *Idaho, *Montana, *Oregon, *Washington, *Highway characteristics, *Fatality rates, *Injury rates, *Automobile accidents, *Truck accidents, *Motorcycle accidents, *Time of accidents, *Day of week, *Time of day, *Pavement condition, *Driver age, *Driver sex, *Drinking drivers, *Traffic law violations, *Single vehicle accidents, *Vehicle vehicle collisions Damage costs, *Ran off road accidents, *Vehicle fixed object collisions,

The accident data given in this report are based on an analysis of police investigation reports on 1,317 fatal accidents which occurred during the period April 1969-March 1970 in Alaska, Idaho, Montana, Oregon, and Washington. Statistics are presented for fatal accidents by accident type, accident location, time of accident, pavement condition, driver condition, driver age, driver sex, vehicle type, driver sobriety, driver's record, fatalities, injuries, and property damage. Special attention is given to the accidents involving single vehicles which ran off the road, since this type of crash made up nearly half the total of all the accidents reported.
HS-013 155

UTAH TRAFFIC ACCIDENTS AND ACCIDENT RATES, 1972

Utah State Dept. of Highways
L. R. JesterB. D. BurninghamC. J. BertolinaD. B. Jones
Corporate author

*Accident statistics, *Accident location, *Accident rates, *Fatality rates, *Injury rates, *Property damage accidents, *Automated accident records, *Traffic volume, *Utah,

Accident rates on Federal aid and State highways are given. Routes are listed in State number sequence, with individual sections identified by milepost limits. Accident rates are compared for 1970, 1971, and 1972. Accident reports were machine processed and analyzed.
HS-013 164

THE MOTORCYCLE IN TRAFFIC ACCIDENTS IN ILLINOIS--1970

Illinois Div. of Highways

HS-103 163

2. HIGHWAY SAFETY

SPECULATION ABOUT TRAFFIC SAFETY

V27 N2
P. O. Roer
Traffic Quarterly v27 n2 p223-37 (Apr 1973)

*Accident risks, *Risk taking, *Fatality rates, *Transportation systems, *Driver skills, *Driver performance, *Environmental factors, *Fatality prevention, *Driver attitudes,

The risk of dying from disease appears to act as a yardstick in determining the amount of risk to which people will submit voluntarily. This basic risk acts as a guide to what is (or is not) considered enough safety. If the risk of being killed in a traffic accident is no greater than the risk of dying from disease, people will be unwilling to seriously consider spending money for highway safety.
HS-013 123

2A. Breakaway Structures

SCALE MODELS OF AUTOMOBILE COLLISIONS WITH BREAKAWAY OBSTACLES

V13 N2
R. I. Emori
Presented at Society for Experimental Stress Analysis Fall Meeting, Milwaukee, 19-22 Oct 1971. Sponsored by California Div. of Highways in cooperation with the Federal Hwy. Administration;
Experimental Mechanics v13 n2 p64-9 (Feb 1973)

*Collision models, *Scale models, *Model tests, *Breakaway structures, *Pole impact tests, *Stress strain characteristics, *Inertial forces, *Gravitation, *Dimensional analysis, *Accident simulation,

In a new approach to scale modeling, the model rules, as well as the essential pi-numbers, are obtained directly from the physical laws identified as governing a phenomenon. Contrary to the widely used parameter approach with dimensional analysis, the new approach simplifies the derivation of model rules and gives a clearer physical meaning to pi-numbers. As an application of the method, a study of automobile collisions with breakaway signposts and lightposts is described. Laboratory tests by scale models conducted according to the established model rules were photographed with high speed motion pictures. Agreement of the breakaway motion with that of full-scale counter parts proved the feasibility of using scale models for design improvements of such obstacles.
HS-013 127

EVALUATION OF BREAKAWAY LIGHTPOLES FOR USE IN HIGHWAY MEDIANS

Texas A and M Univ., Texas Transp. Inst.
N. E. WaltonT. J. HirschN. J. Rowan RR-146-5
Sponsored by the Texas Hwy. Dept. and Federal Hwy. Administration.
Corporate author

*Breakaway light poles, *Median lighting, *Pole impact tests, *Roadside hazards, *Impact attenuation, *Secondary collisions, *Median width, *Pole location,

Crash tests were conducted to determine the impact behavior of median-mounted luminaire supports and secondary collisions of vehicles striking downed poles on a traffic lane. A relative hazard index was developed to describe the relative hazard created by the proximity and frequency of luminaire supports. It was concluded that a 20 degree impact by a 2900 lb vehicle at 45 mph would not cause a pole to encroach on the opposing traffic lane if the median is 40 feet wide. A 4000 lb vehicle impacting at 25 degree and 60 mph would cause a pole to encroach approximately 11 feet into the opposing lane. Under both conditions, the impacting vehicle would cross into the opposing lanes and may be more of a hazard than the poles themselves. A medium size vehicle impacting a downed pole within the traffic lane presents no more hazard than the original impact. From a relative hazard standpoint, median-mounted luminaire systems produce less hazard than house-side systems for median widths of 30 feet or greater.
HS-013 169

2D. Design And Construction

CONSTRUCTION ZONE, DETOUR AND TEMPORARY CONNECTION ACCIDENTS. FINAL REPORT

California Div. of Highways
W. R. Juergens PB-212 799
Contract B-1-3
Prepared incooperation with Federal Hwy. Administration from Accidents Involving Construction Zones, Detours and Temporary Connections. Includes Section 2-30 of the California Construction Manual.
NTIS

*Construction sites, *Construction site accidents, *Detours, *Highway design, *Delineators, *Construction site signs, *Accident rates, *Design standards, *Rural areas, *Urban areas, *Accident report forms, *Accident causes, *Manuals, *Accident studies, *Barrier markings, *California,

Construction zones, detours, and temporary connections usually include geometric features and roadway environments which require more caution on the part of the motorist than normal highway travel. Special care in the design of construction zones, in the use of delineation and warning devices, and in the control of contractor's operations is necessary to minimize the impact of the construction operation on safety. Two studies were made of construction zones to compare the accident rate during construction with the rate for the same portion of highway prior to construction. The first study in 1965 showed that there was a significant increase in accidents due to the construction zone; The second study in 1970 demonstrated that the improved standards and practices now in effect have reduced

the construction zone accident rate to a rate comparable with the rate prior to the beginning of construction.
HS-013 152

AN INNOVATIVE PEDESTRIAN CROSSWALK SAFETY DEVICE DEMONSTRATION

Detroit Dept. of Streets and Traf.
For primary bibliographic entry see Fld. 3K.
HS-013 160

2E. Lighting

INTERCHANGE ILLUMINATION--ENGINEERING AND ECONOMICS

V2 N1

Presented at the Illuminating Engineering Society Annual Conference, Tulsa, 24-27 Jul 1972.
Journal of IES v2 n1 p50-4 (Oct 1972)

*Interchanges, *Highway lighting, *Highway lighting mounting height, *Lighting equipment costs, *Lighting design, *Maintenance, *Luminaires, *Lamp location, *Pole location, *Benefit cost analysis,

The use of high mast type illumination for interchanges requires a careful cost analysis for each individual case; For conventional and often more complicated interchanges 45 to 65-foot mounting heights with fixed luminaires are the most economical. Where soil conditions are poor the footing may increase the overall cost considerably for high mast type systems. High mast systems, however, may offer advantages for area illumination where every square foot is equally important. Such locations are shopping centers, parks, fairs, parking lots, and marshalling yards.
HS-013 125

INTERACTION BETWEEN FIXED AND VEHICULAR ILLUMINATION SYSTEMS. FINAL REPORT

Franklin Inst. Res. Labs.
V. P. GallagherM. S. Janoff FHWA-RD-72-51; F-C28
Contract FH-11-7599
Report for Jun 1970-Jul 1972.
NTIS

*Highway lighting, *Vehicle lighting, *Gap acceptance, *Brightness, *Driver reaction time, *Driver reaction distance, *Visibility, *Performance tests, *Lighting measurement, *Data acquisition, *Face shields, *Goggles, *Variance analysis, *Target detection, *Headlamp glare, *Data reduction, *Data analysis, *Driving task analysis, *Tracking, *T test, *Light conditions, *Contrast, *Reflectance, *Left turns, *Distance perception, *Judgment, *Driver behavior, *Visual perception, *Pedestrian behavior,

Driver's responses to roadway obstacles almost always improved with increased illumination. The effect of coarser uniformities was always decreased target-detection performance. Left turning drivers and pedestrians will utilize available lighting to maximize safety. Gap-acceptance performance variability increases with illumination. Parking lights resulted in an overestimate of separation distance in the intersection crossing situation. The safest separation distance estimates were found at about 1.0 foot-candles ambient and low ing driver and pedestrian gap acceptance to illumination level, uniformity ratio, vehicle lighting, and vehicle speed are reported. Literature reviews of driver performance, lighting methods, and fixed lighting costs and response-detection experiments were conducted, and a Tapeswitch data collection system and a fixed lighting facility to vary lighting levels and uniformity were developed.
HS-013 130

2G. Meteorological Conditions

INFLUENCE OF OPERATING CYCLE ON NOISE OF DIESEL ENGINES

Southampton Univ. (England)
D. AndertonJ. Baker SAE-730241
Presented at International Automotive Engineering Congress, Detroit, 8-12 Jan 1973.
SAE

*Diesel engine noise, *Internal combustion engines, *Combustion noise, *Noise sources, *Cylinder pressure, *Vibration measurement, *Acoustic measurement, *Sound intensity, *Cyclic pressures, *Spectral analysis, *Turbocharging, *Engine speeds, *Blower noise, *Loading (mechanical), *Engine design, *Engine performance, *Engine operating conditions, *Piston engines, *Two stroke cycle engines, *Four stroke cycle engines,

The fundamental effect that cycle difference of a reciprocating internal combustion engine has on noise and performance, together with noise and vibration characteristics of two- and four-cycle diesel engines, is described. Variation in engine surface vibration and noise radiated is linearly related to a force input applied to the structure. A method of predicting combustion noise levels of current automotive diesel engines is outlined. Roots blower casing noise can become a predominant noise source on two-stroke diesel engines if the tip speed is much in excess of 100 feet/second. Engine configuration affects the precise frequency and form of the vibration and noise response. Only in the opposed piston design is the overall noise level increased. A combination of engine performance calculations with the relations for predicting overall engine noise can be used in the initial design stages of new engines to ensure that they will meet specified noise levels.
HS-013 114

2H. Police Traffic Services

POLICE ALCOHOL TRAINING PROJECT. VISUAL AID LOG AND EVALUATION SCORING KEY FOR DETECTION CLUES OF DRINKING DRIVERS

Michigan State Univ. Hwy. Traf. Safety Center
D. H. HolmesJ. E. Keyes
Prepared in cooperation with the Michigan Office of Hwy. Safety Planning and the National Hwy. Traf. Safety Administration.
Michigan Office of Highway Safety Planning

*Police training, *Alcohol education materials, *Slides (visual aids), *Drinking driver evidence, *Driver intoxication, *Driver behavior,

POLICE ALCOHOL TRAINING PROJECT. TECHNICAL REPORT

Michigan State Univ. Hwy. Traf. Safety Center
J. E. Carnahan
Prepared in cooperation with the Michigan Office of Hwy. Safety Planning and the National Hwy. Traf. Safety Administration.
Michigan Office of Highway Safety Planning

*Police training, *Alcohol education materials, *Drinking drivers, *Police law enforcement responsibilities, *Curricula, *Program evaluation, *Michigan, *Police motorist contacts, *Arrest procedures, *Accident investigation, *Driver behavior, *Alcohol chemical tests, *Drinking driver evidence, *Testimony, *Drinking pedestrians, *Police cooperation with other agencies, *Alcohol effects, *Alcohol laws, *Search and seizure, *Police reports, *Driver physical examinations, *Driver records, *Blood alcohol levels, *Flow charts, *Bibliographies, *Driver psychological tests,

The purpose of this project was to develop a one-week training course to improve alcohol enforcement activities in Michigan and produce a reduction in alcohol-related traffic offenses throughout the state. Over half of the instructor-student contact hours are spent in student-oriented practice and laboratory sessions devoted to detection, apprehension, and testifying in court. One third of the course specifically pertains to detection of drinking driver clues. Subject matter on the technical, statistical, and legal matters related to control of the drinking driver is covered to assure understanding not only of the basic principles, empirical evidence (facts), laws and regulations, but also of the role of the officer's enforcement activities in the total alcohol countermeasures program. The training program was developed by identifying and analyzing tasks actually performed in the field by alcohol enforcement officers. Students are evaluated on skill and knowledge achievements.
HS-013 133

POLICE ALCOHOL TRAINING PROJECT. COURSE GUIDE

Michigan State Univ. Hwy. Traf
J. E. Carnahan
Prepared in cooperation with the Michigan Office of Hwy. Safety Planning and the National Hwy. Traf. Safety Administration.
Michigan Office of Highway Safety Planning

*Police training, *Alcohol education materials, *Drinking drivers, *Police law enforcement responsibilities, *Curricula, *Flow charts, *Michigan, *Instructors,

This document is designed for use in planning, organizing, and administering a basic training course for the alcohol enforcement officer. An explanation of the development of the Police Alcohol Training Project is included.
HS-013 134

POLICE ALCOHOL TRAINING PROJECT. INSTRUCTOR'S MANUAL

Michigan State Univ. Hwy. Traf. Safety Center
tion.
Michigan Office of Highway Safety Planning

*Police training, *Alcohol education materials, *Instruction manuals, *Curricula, *Drinking drivers, *Police law enforcement responsibilities, *Arrest procedures, *Accident investigation, *Police motorist contacts, *Alcohol chemical tests, *Driver physical examinations, *Driver psychological tests, *Alcohol laws, *Testimony, *Drinking driver evidence, *Accident rates, *Alcohol usage, *Blood alcohol levels, *Police reports, *Driver behavior, *Alcohol effects, *Bibliographies, *Flow charts, *Driver records, *Visual aids, *Alcohol breath tests, *Breathalyzers, *Evaluation,

This manual contains a compilation of 37 lessons covering alcohol and highway safety, preparation for alcohol law enforcement, detection and apprehension of the drinking driver, prearrest investigation of violations and accidents, handling the drinking driver suspect, psychophysical and chemical testing, alcohol usage and effects, legal authority in alcohol enforcement, and testimony. For each lesson there is a lesson plan and several learning activities. Each lesson has a training objective, one or more behavioral (terminal) objectives, and several learning objectives. The lesson content is in syllabus form and includes instructor references, equipment needed, instructional materials, and evaluation aids.
HS-013 135

POLICE ALCOHOL TRAINING PROJECT. STUDENT MANUAL

Michigan State Univ. Hwy. Traf. Safety Center
J. E. CarnahanD. M. HolmesJ. A. KeyesJ. D. StemlerC. L. Dreveskracht
Prepared in cooperation with the Michigan Office of Hwy. Safety Planning and the National Hwy. Traf. Safety Administration.
Michigan Office of Highway Safety Planning

*Police training, *Alcohol education materials, *Manuals, *Curricula, *Police law enforcement responsibilities, *Drinking drivers, *Michigan, *Alcohol effects, *Alcohol usage, *Arrest procedures, *Police motorist contacts, *Accident investigation, *Driver physical examinations, *Driver records, *Alcohol chemical tests, *Drinking driver evidence, *Alcohol laws, *Testimony, *Driver behavior, *Evaluation, *Police reports, *Breathalyzers, *Alcohol breath tests, *Blood alcohol levels, *Accident rates, *Flow charts, *Driver psychological tests,

This workbook contains the subject matter content for the Police Alcohol Training course in narrative form and is organized in the same manner and cross indexed with the Instructor's Manual. Topics covered include alcohol and highway safety, preparation for alcohol law enforcement detection and apprehension of the drinking driver, prearrest investigation of violations and accidents, handling the drinking driver suspect, psychophysical and chemical testing, alcohol usage and effects, legal authority in alcohol enforcement, and testimony.
HS-013 136

A SAFETY DEMONSTRATION PROGRAM FOR OAKLAND COUNTY, MICHIGAN. FINAL REPORT

Traffic Improvement Assoc. of Oakland County, Mich.
For primary bibliographic entry see Fld. 4B.
HS-800 856

STRUMENTATION CONSIDERATIONS FOR OMPUTERIZED TRAFFIC CONTROL OF A AMOND INTERCHANGE COMPLEX

stem Devel. Corp.
T. BarooshianJ. A. NemeczkyJ. F. Torres TM-4601/008/01; -2
ntract FH-11-7568
TIS

lectronic traffic control, *Diamond interchanges, *Computer ntrolled signals, *Vehicle detectors, *Digital computers, lagnetic loop detectors, *Communication systems, *Traffic rveillance, *Telemetry, *Cables, *Data transmission, ueueing, *Real time operations, *Speed sensors, *Traffic unters, *Performance characteristics, *Lane usage, *Data quisition, *Data processing, *Costs,

e principal instrumentation considerations for implementing computerized traffic control system for a diamond inchange complex are described. Such a traffic control system comprised of a surveillance subsystem (of which the key eleents are vehicle detectors); a traffic signal controller bsystem that activates the signal conditions in response to mputer commands; a digital computer that receives and ocesses the data from the detectors and determines the best tion to take based on this received data; a communications bsystem that links the computer to both the surveillance bsystem and to the signal controller subsystems; and a traffic ntrol interface unit that serves as a buffer between the comnications subsystem and the computer. The characteristics d requirements for each of these subsystems are discussed to necessary level of detail, with the exception of the comter which has already been determined. A cost estimate for plementing this system at a given site is also presented.
-013 157

ESIGN MANUAL FOR TRAFFIC SIGNAL CONTROL F DIAMOND INTERCHANGE COMPLEXES

stem Devel. Corp.
K. MunjalJ. A. NemeczkyJ. F. Torres TM-4601/007/03; PB-2
ntract FH-11-7568
TIS

iamond interchanges, *Traffic signal cycle length, *Traffic nal timing, *Traffic flow, *Traffic density, *Highway design, eak hour traffic, *Traffic capacity, *Traffic counts, *Signald intersections, *Traffic delay, *Traffic signal delay time, raffic signal coordination, *Pedestrian control signals, edestrian crossings, *Traffic control optimization, *Road lth, *Manuals, *Mathematical analysis,

s manual was developed to assist traffic engineers in select the most effective pretimed signal control parameter value (cycle length, splits, phase sequence, offsets) for given mond interchange geometrics and traffic demands. ocedures for optimum signal parameter computations, which determined by first computing traffic demand flow/saturan flow per lane, per signal phase, and per intersection, are lined. A comprehensive example of signal parameters deterination is presented, paralleling the steps of the given ocedures.
-013 158

SAFETY DEVICE DEMONSTRATION

Detroit Dept. of Streets and Traf.
For primary bibliographic entry see Fld. 3K.
HS-013 160

THE EFFECT OF FLARES AND TRIANGULAR DISTRESS SIGNALS ON HIGHWAY TRAFFIC

M. J. AllenS. D. MillerJ. L. Short
Presented at the American Academy of Optometry Annual Meeting, New York, 16 Dec 1972
1973) AN Academy of Optometry v50 n3 p305-15 (Apr

*Flares, *Red warning triangles, *Speed patterns, *Disabled vehicles, *Warning system effectiveness, *Day vs night performance,

The speed of traffic flow past a simulated disabled vehicle was monitored by hidden radar. The vehicle was stationed three feet from the edge of the pavement with its jack in position, the spare tire prominently displayed, and a subject simulating repair work behind the vehicle. Test configurations for day and night tests consisted of no car present and car plus flare and/or triangle at various distances behind the vehicle. Results showed that there is not much difference between the distress signal devices in the daytime, the car itself having as much effect as the device being tested. Every night test showed that the flares provided superior protection in slowing traffic and being detected sooner.
HS-013 162

2J. Traffic Courts

A SAFETY DEMONSTRATION PROGRAM FOR OAKLAND COUNTY, MICHIGAN. FINAL REPORT

Traffic Improvement Assoc. of Oakland County, Mich.
For primary bibliographic entry see Fld. 4B.
HS-800 856

3. HUMAN FACTORS

3A. Alcohol

MOTOR CARRIER ACCIDENT INVESTIGATION. O'NAN TRANSFER COMPANY ACCIDENT--SEPTEMBER 28, 1972--JONESBORO, TENNESSEE

Bureau of Motor Carrier Safety
For primary bibliographic entry see Fld. 1C.
HS-013 102

SYNERGISTIC EFFECTS OF ALCOHOL, METHAPYRILINE, AND CHLORDIAZEPOXIDE ON DRIVERS' EYE MOVEMENTS AND TRACKING ERRORS IN SIMULATED DANGEROUS SITUATIONS

North Carolina Univ. Hwy. Safety Res. Center
S. R. SchroederJ. A. EwingB. A. RouseP. BallJ. A. Allen
Corporate author

*Alcohol effects, *Drug effects, *Driver performance, *Synergism, *Eye movements, *Driving simulators, *Ethyl alcohol, *Antihistaminics, *Chlordiazepoxide, *Tracking, *Driver errors, *Flicker frequency, *Alcohol effect on vision, *Variance anlysis,

tranquilizer (chlordiazepoxide,.2 mg/kg) were administered on different days in combination with a placebo or ethyl alcohol (70mg%). While there were no significant effects of these low doses on driving errors, the effects on eye movements and blink rate were significant. Chlordiazepoxide increased eye movements; synergistic combinations of alcohol with antihistamine and chlordiazepoxide had intermediate effects; and alcohol suppressed large amplitude eye movements. There was a significant negative correlation between driving errors and the ratio of the frequency of long to short discursive eye movements. This suggests that a maladaptive effect of low alcohol concentrations may be to decrease detection of peripheral dangerous events when visual load is high.
HS-013 117

POLICE ALCOHOL TRAINING PROJECT. VISUAL AID LOG AND EVALUATION SCORING KEY FOR DETECTION CLUES OF DRINKING DRIVERS
Michigan State Univ. Hwy. Traf. Safety Center
For primary bibliographic entry see Fld. 2H.
HS-013 132

POLICE ALCOHOL TRAINING PROJECT. TECHNICAL REPORT
Michigan State Univ. Hwy. Traf. Safety Center
For primary bibliographic entry see Fld. 2H.
HS-013 133

POLICE ALCOHOL TRAINING PROJECT. COURSE GUIDE
Michigan State Univ. Hwy. Traf
For primary bibliographic entry see Fld. 2H.
HS-013 134

POLICE ALCOHOL TRAINING PROJECT. INSTRUCTOR'S MANUAL
Michigan State Univ. Hwy. Traf. Safety Center
For primary bibliographic entry see Fld. 2H.
HS-013 135

POLICE ALCOHOL TRAINING PROJECT. STUDENT MANUAL
Michigan State Univ. Hwy. Traf. Safety Center
For primary bibliographic entry see Fld. 2H.
HS-013 136

3B. Anthropomorphic Data

CONTROL LASER DRIVER AIR BAG TESTS
Calspan Corp.
For primary bibliographic entry see Fld. 5N.
HS-013 105

COMPUTER SIMULATION OF THE HUMAN BODY--RESULTS OF AN EXPLORATORY ANALYTICAL AND EXPERIMENTAL STUDY. FINAL REPORT

Calspan Corp.
J. A. Bartz CAL-FE-5125-V-1
Corporate author

tests, *Inertia, *Damping, *Displacement, *Torque, *Coulomb friction, *Feet, *Knees, *Impact velocity, *Braking, *Driver emergency responses, *Passenger emergency responses, *Injury prevention,

Active muscular responses by a vehicle occupant during a crash may have an appreciable effect on his kinematic behavior over a wide range of vehicle speeds, but at high speeds the large injury-producing inertia forces generated during crash will not be attenuated appreciably by the effects of muscular responses to significantly reduce injury. This parametric study points up both the limitations of impact tests with passive anthropometric dummies or cadavers and some of the advantages of a mathematical model of the crash victim to attack a problem of this nature. Modeling of the human anatomy with an ellipsoidal man-model, because of both its basic simplicity and generality, has useful potential in such applications as work space evaluation and interpretation of anthropometric data.
HS-013 116

AN EVALUATION OF THE DYNAMIC PERFORMANCE CHARACTERISTICS OF ANTHROPOMORPHIC TEST DEVICES (95TH PERCENTILE ANTHROPOMORPHIC TEST DUMMY). VOL. 3. FINAL REPORT

Calspan Corp.
J. B. WPALUNASJ. S. Miller FA-5018-V-3-Vol-3
Contract DOT-HS-053-1-129
Report for Jul 1971-Nov 1972.
NTIS

*Anthropomorphic dummies, *Anthropometry, *Anthropomorphic dummy design, *Performance tests, *Drop tests, *Pendulum tests, *Measurement, *Joint motion range, *Center of gravity, *Head forms, *Performance characteristics, *Acceleration response, *Accelerometers, *Static loads, *Deflection, *Displacement, *Dynamic loads, *Flexion Extension, *Test equipment, *Chest impact tolerances, *Head impact tolerances, *Impact sleds, *Barrier collision tests, *Four point restraint systems, *Submarining,

An experimental investigation was conducted to assess the dynamic performance of a 95th percentile anthropomorphic dummy under conditions approximating those expected in vehicle compliance testing. In this study the dimensions, weights, centers of gravity, and pivot locations of the dummy body segments, and the joint ranges-of-motion; the head impact response characteristics; the static and dynamic deflection properties of the head-neck assembly and of the chest assembly; and the basic response of the dummy in simulated 30 mph impacts under four point restraint conditions were determined. All of the required test measurements were obtained without experiencing difficulty, and the measured values were as one would expect for a slightly larger dummy. No serious malfunctions of the dummy were encountered; however, some cracks appeared in the wooden head, and a tear developed in the soft cover around the lumbar spine during the sled impact tests.
HS-800 863

MOTORCYCLE FACTS

National Safety Council
For primary bibliographic entry see Fld. 1C.
HS-013 129

ANALYSIS OF CHILD TRAFFIC ACCIDENTS YEAR 1972.

Detroit Police Dept. Traf. Safety Bureau
For primary bibliographic entry see Fld. 1E.
HS-013 142

THE MOTORCYCLE IN TRAFFIC ACCIDENTS IN ILLINOIS--1970

Illinois Div. of Highways
For primary bibliographic entry see Fld. 1E.
HS-103 163

3D. Driver Behavior

SYNERGISTIC EFFECTS OF ALCOHOL, METHAPYRILINE, AND CHLORDIAZEPOXIDE ON DRIVERS' EYE MOVEMENTS AND TRACKING ERRORS IN SIMULATED DANGEROUS SITUATIONS

North Carolina Univ. Hwy. Safety Res. Center
For primary bibliographic entry see Fld. 3A.
HS-013 117

TRAFFIC ACCIDENTS--THE UNCOMMON COMMON EVENTS PROBLEM

V27 N2
B. D. Greenshields
Traffic Quarterly v27 n2 p211-22 (Apr 1973)

*Accident risk forecasting, *Accident proneness, *High risk drivers, *Driver performance, *Driver tests, *Accident location, *Road tests, *Age factor in driving, *Driver experience, *Driver records, *Traffic flow,

The rarity of traffic accidents for the individual driver on a short section of highway results from the fact that traffic accidents are distributed among over 100 million drivers traveling over one trillion miles per year on 3.7 million miles of road. A method of detecting high risk drivers by giving a road test to a sample of young and inexperienced, high accident, high violation, and experienced drivers with no accidents or violations is developed. Accidents are caused by the rates of changes of speed and direction. Accidents happen when there is not sufficient space or time for vehicle motion to take place. A formula for measuring the quality of traffic flow which can be used to determine dangerous highway locations is presented.
HS-013 122

MAXIMUM BRAKE PEDAL FORCES PRODUCED BY MALE AND FEMALE DRIVERS

General Motors Corp.
C. R. VonBuseck
Excerpts from Maximum Parking Brake Forces Applied by Male and Female Drivers (EM-23) BY R. L. Bierley, 1965, are included.
Corporate author

*Female drivers, *Driver vehicle interface, *Hand brakes, *Parking brakes, *Manual performance, *Braking,

The object of this research was to obtain data concerning the maximum amount of brake pedal force that automobile drivers were able to sustain over a period of ten seconds. Subjects were told to apply the brakes in the test car as they would in a panic stop, and to exert as much force as possible on the pedal over the entire ten second test period. A total of 84 subjects were tested, including 42 males and 42 females. The results indicated that there is a wide distribution of values which characterizes the pedal force that the subjects were able to generate. Male subjects produced generally higher forces than did females. Over half the women tested were unable to exert more than 150 lbs. of force with either foot alone, but when both feet were applied to the pedal, force levels rose significantly.
HS-013 124

AN EVALUATION OF THE NATIONAL SAFETY COUNCIL'S DEFENSIVE DRIVING COURSE IN SELECTED STATES. FINAL REPORT

National Safety Council
For primary bibliographic entry see Fld. 3E.
HS-013 128

INTERACTION BETWEEN FIXED AND VEHICULAR ILLUMINATION SYSTEMS. FINAL REPORT

Franklin Inst. Res. Labs.
For primary bibliographic entry see Fld. 2E.
HS-013 130

NATIONWIDE PERSONAL TRANSPORTATION STUDY. REPORT 6. CHARACTERISTICS OF LICENSED DRIVERS

Federal Hwy. Administration
R. E. Gish 6
Corporate author

*Female drivers, *Male drivers, *Driver age, *Driver mileage, *Driver residence, *Standard Metropolitan Statistical Areas, *Urban areas, *Suburban areas,

Approximately 56.3% of all licensed drivers in 1970 were males, and they drove about 73% of the total annual mileage. Males drove over twice as many miles annually as females. The peak driving age for males was 30-34 and for females it was 45-49, although the annual mileage for females was nearly constant from 35 to 49. Annual mileage varied more for males than for females; The proportion of population 16 years and older with driver licenses was similar in unincorporated and incorporated areas of less than 25,000 population; for incorporated places with over 25,000 population, the proportion of drivers gradually decreased as place size increased up to 1,000,000 and over. There was no clear relationship between the proportion of licensed drivers and the size of the Standard Metropolitan Statistical Area except for places 3,000,000 and over which had the smallest percentage of drivers.
HS-013 137

INFLUENCING DRIVER BEHAVIOR THROUGH CLASSROOM FILMS. FINAL REPORT

California Univ. Inst. of Transp. and Traf. Engineering

Sponsored by California Div. of Highways.
NTIS

*Driver behavior, *Motion pictures, *Driver education, *Arousal, *Galvanic skin response, *Psychological factors, *Driver characteristics, *Learning rates, *Accident risk forecasting, *Electroencephalography, *Correlation analysis, *Galvanic skin response measurement, *Memory,

Studies of information retention related to arousal during continuously-presented material; personality and biographical variables related to driving item response; evoked potential related to subsequent alpha frequency; attention and consolidation as retention factors; accident and conviction prediction; retention of information in driver education films; short-term, auditory, and visual retention related to arousal; juvenile driving violator personality characteristics; influencing driving behavior through films; student personality and academic achievement; self-esteem and opinion change; and need for control data in self-esteem and persuasibility studies are summarized. Students recall more information in traffic safety films if that information is presented just before or after the student's skin resistance decreases (GSR). Since GSR can be induced in exciting events, traffic safety films should schedule important information at exciting portions of the film. This suggests that films shoudl be developed to influence specific driving behavior and should be tested by using homogeneous groups.
HS-013 153

MARGIN OF SAFETY: THE SAFETY BUBBLE AROUND YOUR CAR

L. E. Schlesinger
1973) TS FOR Traffic Safety p2-5 (Spring/Summer

*Driver behavior, *Driving tasks, *Gap utilization, *Gap acceptance, *Distance perception, *Decision making, *Driver experience, *Driver performance, *Driver skills,

The driver is continually comparing two spaces--the space between his car and others, and the space needed to perform a maneuver such as braking, accelerating, or turning to avoid a collision. The ratio of these two spaces has been called the margin of safety. As the spaces become equal, the margin of safety is smaller, and accidents occur when the space required for a maneuver becomes less than the space available. Studies on drivers' varying abilities to estimate gaps indicate that driver education should include the development of skill in acquiring visual information and in estimating time-distance gaps.
HS-013 168

PROGRAMS AND PROBLEMS IN REHABILITATION OF THE HIGH RISK DRIVER

Virginia. Highway Res. Council
W. A. AmesS. L. Micas VHRC-72-R9
Sponsored by Virginia Hwy. Safety Div.
Corporate author

*High risk drivers, *Driver rehabilitation, *Accident risk forecasting, *Driver evaluation devices, *Safety programs, *Driver behavior, *Warning letters, *Driver interviews, *Driver improvement, *Discussion groups, *Driver behavior research, *Driver licensing, *Driver license reexamination, *Classified

*Virginia, *Driver license laws, *State laws, *Driver attitude measurement,

Currently the sanctions applicable to traffic violations emphasize a punitive approach, premised on the assumption that the violation is the result of deliberate risk taking or, at the least, avoidable carelessness, for which punishment will serve as a deterrent to repetitions. This characterization of the traffic offender tends to ignore the complex nature of the psychomotor process called driving. The purpose of this study was to explore alternatives to the punitive approach with an eye to rehabilitating the driver rather than punishing him. Various alternatives examined included prediction of driving behavior, administrative warning letters, driver improvement interviews, driver reeducation, group driver improvement discussion sessions, behavior modification techniques, driver retesting, and occupational licensing.
HS-013 170

3E. Driver Education

AN EVALUATION OF THE NATIONAL SAFETY COUNCIL'S DEFENSIVE DRIVING COURSE IN SELECTED STATES. FINAL REPORT

National Safety Council
T. W. PlanekS. A. SchupackR. C. Fowler
Corporate author

*Driver education evaluation, *Defensive driving, *Driver performance, *Driver records, *Driver improvement, *Accident rates, *Traffic law violations, *Data acquisition, *Data analysis, *Chi square test, *T test, *Variance analysis, *Driver mileage, *Driver age, *Driver sex, *Driver educational levels, *Accident types, *Accident severity, *Seat belt usage, *Driver experience, *Questionnaires, *Highway classification, *Accident causes,

A group of 8,182 Defensive Driving Course (DDC) graduates (study group) in 26 states was surveyed regarding their accident and violation histories for the year preceding DDC. One year later, 72% of these drivers were surveyed for the year following DDC. Comparison group information was obtained for 2,397 drivers who entered DDC one year later. Records from seven states were collected for approximately one third of the study and comparison group samples. DDC graduates reported 32.8% fewer accidents and 24;9% fewer violations in the year after DDC as compared to the year before. The study group respondent accident and violation rates were lower than comparison group rates. Accidents and violations were broken down by driver and accident characteristics. State records showed 17.6% fewer accidents and 12.5% fewer violations for the study group and 11.9% more accidents and 12.4% fewer violations for the comparison group in the year after as compared with the year before DDC.
HS-013 128

INFLUENCING DRIVER BEHAVIOR THROUGH CLASSROOM FILMS. FINAL REPORT

California Univ. Inst. of Transp. and Traf. Engineering
For primary bibliographic entry see Fld. 3D.
HS-013 153

3F. Driver Licensing

LICENSING THE ELDERLY DRIVER--LEGAL AND SCIENTIFIC PROBLEMS

V73 N5
E. L. Wiener
Traffic Safety v73 n5 p8-11, 36-7 (May 1973)

*Aged drivers, *Driver licensing, *Driver license laws, *Driver license reexamination, *Driver physical examinations, *Driver physical fitness, *Age factor in driving, *Computerized driver testing, *Driver license restrictions, *Flow charts, *Driver license standards, *Driver license denial,

Laws that discriminate against older drivers on the basis of age alone, rather than demonstrated ability or incapacity, are on unsound constitutional grounds, due to stricter interpretations of the equal protection clause of the 14th Amendment. It is recommended that aged drivers be submitted either voluntarily or by court decree to computerized driver license examinations involving rapid screening for physical defects, testing of knowledge of driving laws and skills, and simulated driving tasks; Test results should be correlated with the subject's past driving record and the post-examination driving record of the subject should be followed up. Those with high scores could be issued unconditional licenses. Those with extremely low scores would be failed, but could reappear for retesting later. And those with moderate scores or certain classes of deficiencies could be retrained, retested, or given road tests or a restricted license.
HS-013 139

THE DEVELOPMENT OF WRITTEN EXAMINATIONS ON THE MOTOR CARRIER SAFETY REGULATIONS. FINAL REPORT

Richardson, Bellows, Henry and Co., Inc.
RBH-TR-72-1; BMCS-RD
Contract FH-11-7807
NTIS

*Driver tests, *Motor carriers, *Safety laws, *Driver evaluation devices, *Bus drivers, *Truck drivers, *Certification, *Transportation of hazardous materials, *Racial factors, *Data analysis, *Statistical analysis, *Driver educational levels, *Driver experience,

The development of a set of written examinations designed to measure commercial driver candidate knowledge of the Motor Carrier Safety Regulations is described. Candidates are recommended to be required to correctly answer 70% of the items in whatever examination form is utilized before they are considered qualified to drive, in terms of safety regulations knowledge. Four standardized multiple-choice test forms have been developed, two to be used by carriers whose drivers will not transport hazardous materials, two to be used by carriers whose drivers will transport hazardous materials. The test forms are considered to meet the technical requirements for such measuring instruments in terms of reliability, internal consistency, and equivalency. Under the distinctions provided in the Equal Employment Opportunity Commission Guidelines on Employee Selection Procedures, the Office of Federal Contract Compliance Employee Testing and Other Selection Procedures, and the American Psychological Association Standards for Education and Psychological Tests and Manuals, the examinations should be considered content valid achievement tests.
HS-013 154

PROGRAMS AND PROBLEMS IN REHABILITATION OF THE HIGH RISK DRIVER

Virginia. Highway Res. Council
For primary bibliographic entry see Fld. 3D.
HS-013 170

3G. Drugs Other Than Alcohol

SYNERGISTIC EFFECTS OF ALCOHOL, METHAPYRILINE, AND CHLORDIAZEPOXIDE ON DRIVERS' EYE MOVEMENTS AND TRACKING ERRORS IN SIMULATED DANGEROUS SITUATIONS

North Carolina Univ. Hwy. Safety Res. Center
For primary bibliographic entry see Fld. 3A.
HS-013 117

3K. Pedestrians

INTERACTION BETWEEN FIXED AND VEHICULAR ILLUMINATION SYSTEMS. FINAL REPORT

Franklin Inst. Res. Labs.
For primary bibliographic entry see Fld. 2E.
HS-013 130

INTERACTION BETWEEN FIXED AND VEHICULAR ILLUMINATION SYSTEMS. FINAL REPORT

Franklin Inst. Res. Labs.
For primary bibliographic entry see Fld. 2E.
HS-013 130

ANALYSIS OF CHILD TRAFFIC ACCIDENTS YEAR 1972.

Detroit Police Dept. Traf. Safety Bureau
For primary bibliographic entry see Fld. 1E.
HS-013 142

AN INNOVATIVE PEDESTRIAN CROSSWALK SAFETY DEVICE DEMONSTRATION

Detroit Dept. of Streets and Traf.
A. F. MaloA. FreedD. E. ClevelandJ. V. ArthungalC. Jorgeson
HSR1-TrS-8
Prepared in cooperation with the Michigan Office of Hwy. Safety Planning and the National Hwy. Traf. Safety Administration.
Corporate author

*Crosswalks, *Pedestrian control signals, *Traffic information signs, *Warning signals, *Signalized intersections, *Uncontrolled intersections, *Intersection lighting, *Display systems, *Pedestrian detectors, *Pedestrian safety, *Pedestrain behavior, *Driver behavior, *Flashing warning signals, *Buzzers, *Signal effectiveness, *Warning system effectiveness, *Detroit,

Informational messages were transmitted through the media of lighted signs, lighted legends, better illumination, and buzzing sounds at 13 unsignalized and signalized crosswalks. Three types of information systems were evaluated: those consisting of dynamic devices only, those consisting of static devices only, and those consisting of both dynamic and static devices. Findings included: significantly greater relative use of the crosswalk following installation of devices; no substantial effect on the speed distribution of free-moving vehicles in the vicinity of the crosswalk; a significant change in the braking

response of motorists to a pedestrian waiting to cross the street after the information systems were installed; and increased pedestrian usage of push buttons at signalized intersections.
HS-013 160

3L. Vision

SHOULD REAR LIGHTS OF MOTOR VEHICLES BE COLOR CODED?
For primary bibliographic entry see Fld. 5J.
HS-013 103

4. OTHER SAFETY-RELATED AREAS

4B. Community Support

A SAFETY DEMONSTRATION PROGRAM FOR OAKLAND COUNTY, MICHIGAN. FINAL REPORT

Traffic Improvement Assoc. of Oakland County, Mich.

Contract FH-11-7542
Report for Aug 1970-Jan 1973.
NTIS

*Highway safety programs, *Traffic management, *Demonstration projects, *Public information programs, *Accident causes, *Traffic law enforcement, *Police traffic services Traffic courts, *Program evaluation, *Public opinion, *Safety program effectiveness, *Questionnaires, *Driver behavior, *Accident statistics, *Day of week, *Time of day, *Month, *Driver attitudes, *Attitude measurement, *Accident prevention, *Drinking drivers, *Driver mileage, *Driver age, *Traffic law violations, *Michigan, *Design of experiments,

The Oakland County Safety Demonstration Project focused on improvement of traffic law enforcement, including police traffic services and traffic court operations. Procedures by which citizen task forces selected this problem are presented. The initial steps in the implementation of a comprehensive traffic law enforcement program included public opinion studies, surveys of police traffic services and traffic court operations, driver obedience studies, and public education activities. Questionnaires, problem identification matrixes, management models, public education exhibits, and other tools developed for the program are included.
HS-800 856

4C. Cost Effectiveness

INTERCHANGE ILLUMINATION--ENGINEERING AND ECONOMICS
For primary bibliographic entry see Fld. 2E.
HS-013 125

STANDARDIZATION OF AUTOMOTIVE DIAGNOSTIC SYSTEMS. INTERNATIONAL CONGRESS ON AUTOMOTIVE SAFETY (1ST) JULY 17-19, 1972
National Motor Vehicle Safety Advisory Council
For primary bibliographic entry see Fld. 5I.
HS-820 212

STANDARDIZATION OF AUTOMOTIVE DIAGNOSTIC SYSTEMS. INTERNATIONAL CONGRESS ON AUTOMOTIVE SAFETY (1ST) JULY 17-19, 1972
National Motor Vehicle Safety Advisory Council
For primary bibliographic entry see Fld. 5I.
HS-820 212

4E. Information Technology

INSTRUMENTATION CONSIDERATIONS FOR COMPUTERIZED TRAFFIC CONTROL OF A DIAMOND INTERCHANGE COMPLEX
System Devel. Corp.
For primary bibliographic entry see Fld. 2I.
HS-013 157

STUDY TO DETERMINE THE RELATIONSHIP BETWEEN VEHICLE DEFECTS AND FAILURES, AND VEHICLE CRASHES. VOL. 1. FINAL REPORT
Indiana Univ.
For primary bibliographic entry see Fld. 1C.
HS-800 850

4G. Mathematical Sciences

AUTOMATIC GUIDANCE OF PNEUMATIC TIRED VEHICLES
Calspan Corp.
For primary bibliographic entry see Fld. 5D.
HS-013 104

COMPUTER DESIGN OF AUTOMOTIVE LAMPS WITH FACETED REFLECTORS
For primary bibliographic entry see Fld. 5J.
HS-013 106

TWO-STAGE MULTILEAF SPRING DESIGN
General Motors Corp.
For primary bibliographic entry see Fld. 5R.
HS-013 110

INFLUENCE OF OPERATING CYCLE ON NOISE OF DIESEL ENGINES
Southampton Univ. (England)
For primary bibliographic entry see Fld. 2G.
HS-013 114

AN ANALYSIS OF THE RELATIONSHIP BETWEEN DRIVER INJURY AND VEHICLE AGE FOR AUTOMOBILES INVOLVED IN NORTH CAROLINA ACCIDENTS DURING 1966-1970
North Carolina Univ. Hwy. Safety Res. Center
For primary bibliographic entry see Fld. 1B.
HS-013 115

COMPUTER SIMULATION OF THE HUMAN BODY--RESULTS OF AN EXPLORATORY ANALYTICAL AND EXPERIMENTAL STUDY. FINAL REPORT
Calspan Corp.
For primary bibliographic entry see Fld. 3B.
HS-013 116

SCALE MODELS OF AUTOMOBILE COLLISIONS WITH BREAKAWAY OBSTACLES

For primary bibliographic entry see Fld. 2A.
HS-013 127

ADVANCES IN TIRE COMPOSITE THEORY

For primary bibliographic entry see Fld. 5V.
HS-013 150

DEVELOPMENT OF A TRAFFIC ACCIDENT ANALYSIS SYSTEM. FINAL REPORT

Georgia State Hwy
For primary bibliographic entry see Fld. 1C.
HS-013 151

DESIGN MANUAL FOR TRAFFIC SIGNAL CONTROL OF DIAMOND INTERCHANGE COMPLEXES

System Devel. Corp.
For primary bibliographic entry see Fld. 2I.
HS-013 158

4H. Transportation Systems

NATIONWIDE PERSONAL TRANSPORTATION STUDY, REPORT 7: HOUSEHOLD TRAVEL IN THE UNITED STATES

Federal Hwy. Administration
T. GoleyG. BrownE. Samson 7
Corporate author

*Automobile usage, *Travel patterns, *Trip purpose, *Trip frequencies, *Vehicle mileage, *Trip length, *Income, *Population density, *Surveys, *Questionnaires,

Data for the Nationwide Personal Transportation Survey were collected in 1969-70 by the Bureau of the Census. The survey was based on a multistate probability sample of housing units located in 235 sample areas, representing every State and the District of Columbia. It was found that residents of households in the U. S. annually make 87 billion trips in which an automobile or taxi is the only transportation mode used; passenger car travel per household averages 3.8 trips and 34 vehicle miles daily; the average number of automobile trips per year, per household, increases as the level of household income rises; differences in household income are also related to the number of trips made for each major purpose; and trips made purely for the pleasure of the drive comprise only 1-2% of all trips. Information is also presented on the major purposes and average length of daily trips.
HS-013 138

5. VEHICLE SAFETY

5A. Brake Systems

SINGLE POWER SOURCE FOR BOTH POWER STEERING AND POWER BOOSTED BRAKES

Bendix Corp.
D. E. RunkleU. Grinbergs SAE-720913
Presented at National Commercial Vehicle Engineering and Operations Meeting, Fort Wayne, 9-12 Oct 1972.
SAE

*Brake boosters, *Hydraulic brakes, *Power steering pumps, *Electric motors, *Hydraulic equipment, *Brake system design, *Truck brakes, *Performance characteristics, *Performance tests, *Stopping distance, *Brake performance, *Pedal force, *Disc brakes, *Brake tests, *Hydro Boost,

Improved power brake booster designs and systems with redundant capabilities are anticipated to be required as a result of the new safety regulations for improved stopping distances, and indirectly, as the result of the new emission controls because of the potential loss of vacuum availability and increased underhood temperatures. Hydraulics in the form of the Bendix Hydro-Boost system with an integral electric motor pump backup, was settled upon by the Bendix Corp. as one major approach to best serve the industry. The design and operating chracteristics of the Bendix Hydro-Boost Power Brake Booster Unit for trucks are presented, Results of performance tests including stopping distance tests; system response tests with various foundation brake systems; determination of Hydro-Boost effect on steering capabilities; hot and cold environment tests; and city driving duty cycle (pump work load) tests, are presented.
HS-013 097

A COMPARATIVE STUDY BY VEHICLE TESTING OF COPPER ALLOY AND GRAY IRON BRAKE DISCS

Bendix Corp.
S. K. RheeJ. E. Byers SAE-720930
Presented at National Commercial Vehicle Engineering and Operations Meeting, Fort Wayne, 9-12 Oct 1972.
SAE

*Brake discs, *Brake disc materials, *Copper alloys, *Gray iron, *Brake tests, *Performance tests, *Durability tests, *Brake wear, *Brake dynamometers, *Road tests, *Brake torque, *Brake performance, *Brake temperature, *Wear resistance, *Thermal conductivity, *Brake friction, *Speed,

Brake discs made of chromium copper were evaluated and compared with gray cast iron discs. The thermal conductivity of chromium copper is six times greater than that of gray cast iron. The evaluation methods were dynamometer and vehicle tests. In all cases, the copper alloy brakes were found to run substantially cooler than gray cast iron brakes. The copper alloy brakes were more effective in terms of torque or deceleration at high temperatures, and showed substantially lower wear of the friction material as well as of the disc when compared with gray cast iron brakes. The copper alloy discs used did not have any coatings on the surface.
HS-013 098

ELECTRIC TRAILER BRAKES

Kelsey-Hayes Co.
D. D. Brown SAE-730282
Presented at International Automotive Engineering Congress, Detroit, 8-12 Jan 1973.
SAE

*Electrohydraulic brake systems, *Trailer brakes, *Brake system design, *Brake controls, *Towing, *Brake performance, *Vehicle stability,

Size ranges and applications of electiric trailer brakes are presented. The most popular type of controller is the hydrauli-

cally actuated unit. A self-actuated controller is also described. Auxiliary control units used with electric brakes are the current-limiting resistor, the breakaway switch, and sway control. With electric brakes it is possible to provide lead braking of the trailer over the tow vehicle which keeps the trailer hitch in tension throughout the stop, and it is easier to adapt the trailer braking system to the tow vehicle braking system. Most electric brake controls provide a manual override of the trailer brakes. Electric brakes have a better long-term storage life and are only very slightly sensitive to corrosion buildup. Total cost is typically lower for an electric brake system. Independent stopping capability can be easily provided for the trailer, thus furnishing breakaway protection.
HS-013 113

MAXIMUM BRAKE PEDAL FORCES PRODUCED BY MALE AND FEMALE DRIVERS

General Motors Corp.
For primary bibliographic entry see Fld. 3D.
HS-013 124

RECENT STUDIES OF TIRE BRAKING PERFORMANCE

For primary bibliographic entry see Fld. 5V.
HS-013 144

A DIAGONALLY BRAKED VEHICLE FOR THE INVESTIGATION OF TIRE TRACTION

For primary bibliographic entry see Fld. 5V.
HS-013 145

FRICTION MATERIALS, THEIR CHARACTERISTICS AND METHODS OF USE IN BRAKES AND CLUTCHES

V17 N4

1973) ERING Materials and Design v17 n4 p13-7 (Apr

*Brake lining materials, *Clutch facings, *Thermal diffusion, *Asbestos, *Brake fade, *Sintering, *Brake lining wear, *Friction brakes, *Friction clutches, *Friction materials,

Properties of woven cotton, woven asbestos, sintered methods, and cerments are given. Reasons for wear and brake fade are described. Different types of brakes and clutches are summarized.
HS-013 165

FMVSS 105 BRAKE TESTS OF THE AMF INC. AND FAIRCHILD INDUSTRIES EXPERIMENTAL SAFETY VEHICLES. FINAL REPORT.

Dynamic Science
2310-72-25
Contract DOT-OS-10187
Report for Jul 1971-Aug 1972.
NTIS

*Brake tests, *Experimental vehicles, *Safety cars, *Brake standards, *Brake performance, *Test tracks, *Data acquisition, *Fifth wheel devices, *Thermocouples, *Servomechanisms, *Calibration, *Pedal force, *Accelerometers, *Data processing, *Brake system design, *Parking brakes, *Emergency brakes, *Burnishing, *Water effect on brakes, *American Machine and Foundary Co., *Fairchild Industries, Inc., *Electrohydraulic brake systems, *Compliance tests, *Safety standards compliance, *Disc brakes, *Drum brakes, *Warning systems,

The American Machine and Foundary Co. experimental safety vehicle (ESV) brake system consists of four hydraulic, power assisted, electronically modulated disc brakes. The brake system status is displayed in the passenger compartment and consists of reservoir, brake failure, and anitskid warning lights. The Fairchild Industries ESV brake system is similar to that of the American Machine and Foundry Co. ESV. However, the rear wheels are equipped with drum brakes and the passenger compartment display consists of only brake failure and antiskid warning lights. Preburnish; parking and emergency brake; and brake effectiveness, fade and recovery, and pre-water and water recovery tests were conducted under 60% rated load conditions on an asphaltic surface with a skid number of 75 5 to assess compliance with Federal Motor Safety Standard 105. The test track, data acquisition, and mechanical problems that occurred during the tests are described. Test results are presented in tabular format.
HS-800 853

5C. Cycles

MOTORCYCLE FACTS

National Safety Council
For primary bibliographic entry see Fld. 1C.
HS-013 129

THE MOTORCYCLE IN TRAFFIC ACCIDENTS IN ILLINOIS--1970

Illinois Div. of Highways
For primary bibliographic entry see Fld. 1E.
HS-103 163

5D. Design

WHAT'S HAPPENED TO SECONDARY WIRING LIFE?

United Air Lines, Inc.
C. N. Hostert SAE-720918
Presented at National Commercial Vehicle Engineering and Operations Meeting, Fort Wayne, 9-12 Oct 1972.
SAE

*Wiring, *Wire, *Ignition systems, *Service life, *Ignition system failures, *Manintenance, *Engine design, *Internal combustion engines,

The deterioration of secondary ignition wiring life on internal combustion gasoline engines has created many maintenance problems in the field. The mandatory use of TVRS (resistance wire) has amplified these problems and made them more difficult to solve. Specific examples of wiring failures are presented. The solution does not lie solely with wire design. Engine application, engine design, and component selection and location are also important factors.
HS-013 096

AUTOMATIC GUIDANCE OF PNEUMATIC TIRED VEHICLES

Calspan Corp.
D. J. Segal YC-2810-V-1
Corporate author

*Guidance systems, *Pneumatic tires, *Vehicle guidance, *Vehicle control, *Guideway systems, *Vehicle dynamics, *Errors, *Computerized simulation, *Vehicle stability, *Sensors, *Lateral acceleration, *Yaw, *Mathematical models,

A lateral guidance control system algorithm was developed for use with a nonlinear model of automobile dynamics in an attempt to apply a somewhat general error sensing system together with a simplified control system transfer function as the first step toward developing a general model with applications in the field of rapid transit systems. Results of simulation runs using three types of control systems, which were made to check the calculations of the model and to determine response variations of the model due to changes in control system parameters, are illustrated graphically. The analytical development of the model is presented.
HS-013 104

OUTBOARD MARINE CORP.'S PRODUCTION ROTARY COMBUSTION SNOWMOBILE ENGINE

Outboard Marine Corp.
3RD., H. M. WardM. J. GriffithG. E. MillerD. K. Stephenson
SAE-730119
Presented at International Automotive Engineering Congress, Detroit, 8-12 Jan 1973.
SAE

*Rotary engines, *Snowmobile engines, *Engine design, *Cooling system design, *Engine performance, *Lubrication, *Engine noise, *Noise control, *Ignition systems, *Fans, *Engine housings, *Charge cooled rotors, *Air cooled engines, *Air induction, *Exhaust ports, *Seals, *Bearings, *Materials tests, *Exhaust systems, *Engine inspection, *Air leakage tests, *Mufflers, *Engine operating conditions, *Silencers,

Design concepts for snowmobile application of the rotary combustion engine are discussed. Cooling, one of the most difficult obstacles for air-cooled, charge-cooled engines; engine performance, balancing, lubrication, noise control, seals and bearings; the capacitive discharge ignition system; and the exhaust system are described. Finally, internal inspection through the exhaust ports and by means of a static air leak test is explained.
HS-013 112

THE QUEST FOR A CLEAN MACHINE. THE ROTARY REVOLUTION

V73 N5
R. B. Overend
Traffic Safety v73 n5 p22-5, 37-8 (May 1973)

*Wankel engines, *Exhaust emission control, *Engine design, *Operating temperature, *Gasoline mileage, *Fuel economy, *Engine size, *Oil consumption, *Automobile costs, *Piston engines, *Vehicle operating costs, *Exhaust emission standards, *Spark plugs, *Combustion chambers, *Mazdas,

The Mazda, equipped with a Wankel engine, meets 1975 emission standards because leakage was reduced by coating the combustion chamber walls with steel, low combustion chamber temperature reduces nitrogen oxide formation, and the engine is small enough to accommodate pollution control equipment. Wankel engine power increases with speed, but the driver must watch the tachometer to prevent the engine from racing too high in low gear since the rotary does not produce the loud whining sound other engines do when they are pushed too high. A rotary engine burns 15 to 20% more fuel than a comparable piston engine, and oil changes on the Mazda are recommended every 4,000 miles. Spark plugs also have to be changed more frequently than on piston engines. The Mazda RX-2, a subcompact, sells for about $3,200, far more than a similar piston engine car. Rotary engine design and future use are discussed.
HS-013 140

THE MILLION DOLLAR RACE FOR THE POLLUTION-FREE CAR

For primary bibliographic entry see Fld. 5F.
HS-013 161

FRICTION MATERIALS, THEIR CHARACTERISTICS AND METHODS OF USE IN BRAKES AND CLUTCHES

For primary bibliographic entry see Fld. 5A.
HS-013 165

'TIS FOLLY TO BE BLIND--UNNECESSARILY

V138 N4013
M. Scarlett
Auto Car v138 n4013 p4-7 (26 Apr 1973)

*Rear visibility, *Blind spots, *Rear windows, *Side windows, *Window frames, *Windshield mounting, *Automobile design, *Roof supports, *Field of view,

Built-in blind spots caused by windshield mountings and roof supports are criticized. These supports can be made thinner and still retain the structural qualities needed for the support of the roof.
HS-013 167

FRONT-TO-SIDE CRASH TEST OF GENERAL MOTORS EXPERIMENTAL SAFETY VEHICLES. FINAL REPORT

Dynamic Science
2310-72-32
Contract DOT-HS-046-2-468
Report for Jul-Oct 1972.
NTIS

*Experimental automobiles, *Safety cars, *Vehicle impact tests, *Side impact tests, *General Motors Corp., *Test facilities, *Test equipment, *Data acquisition, *Data reduction, *Vehicle dynamics, *Kinetics, *Crush distance, *Collapse, *Acceleration, *Structural deformation analysis, *Accelerometers, *High speek photography,

Test procedures and results of the crash test of two General Motors' experimental safety vehicles in a front-to-side configuration are presented. The test consisted of a forward-moving vehicle impacting a like stationary vehicle at 29.60 mph. The objectives of this test were to establish the structural responses of both the striking and struck vehicles and to establish the side intrusion characteristics of the struck vehicle. A plan for front-to-side crash test, crash injury reduction test series is presented in the appendix.
HS-800 855

AUTOMOTIVE RECORDER RESEARCH AND ITS EFFECTS ON FUTURE VEHICLE SAFETY

National Hwy. Traf. Safety Administration
S. S. TeelN. W. Lutkefedder
Presented at Vehicle Safety Res. Integration Symposium, District of Columbia, 30-31 May 1973, by Agbabian Associates. relative importnace of countermeasure emphasis. The development, production, and installation of automotive recorders which record operational (precrash) and crash data, and the possibility of using the recorders to develop an accident severity index of greater reliability than
NHTSA

*Recorders, *Accident severity index Accelerometers, *Transducers, *Magnetic tapes, *Sensors, *Performance tests, *Prototypes, *Impact tests, *Fleets, *Vibration tests, *Ambient temperatures, *Impact sleds, *Parameters, *Errors, *Precrash phase, *Crash phase,

The Automative Recorder Research Program was established to assess present vehicle safety standards, confirm the needs and criteria for future accident avoidance and crash survivability standards, correlate accident severity with occupant injuries and fatalities, assess driver performance under real-world conditions to improve preventative and remedial driver education curricula, and determine the relative importnace of countermeasure emphasis. The development, production, and installation of automotive recorders which record operational (precrash) and crash data, and the possibility of using the recorders to develop an accident severity index of greater reliability than present methods of estimating crash severity are discussed.
HS-820 280

5F. Fuel Systems

TRANSPORTATION CONTROLS TO REDUCE MOTOR VEHICLE EMISSIONS IN SALT LAKE CITY, UTAH. FINAL REPORT

GCA Corp.
APTD-1445
Contract EPA-68-02-0041
Report for 14 Aug-15 Dec 1972. Prepared in cooperation with subcontractors Wilbur Smith and Associates, Inc., and Abt Associates, Inc.
Environmental Protection Agency; NTIS

*Exhaust emission control, *Transportation planning, *Air quality standards, *Salt Lake City, *Air pollution, *Vehicle mileage, *Vehicle inspection, *Retrofitting, *Traffic control, *Traffic flow, *Parking regulations, *Rapid transit systems, *Automobile bans, *Environmental impact statements, *Staggered work times, *Car pools, *Traffic density, *Traffic surveillance, *Air pollution measurement, *Carbon monoxide, *Hydrocarbons, *Oxidizers, *Trip purpose, *Trip length, *Time of day, *Exhaust densities, *Vehicle age, *Benefit cost analysis, *Month, *Seasons, *Questionnaires, *Forecasting, *Vehicle characteristics, *Vehicle air pollution,

Methods of controlling carbon monoxide and oxidant emissions to meet 1977 air quality standards in Salt Lake City are presented. The contribution of vehicle miles of travel to air pollution is emphasized. The effectiveness of suggested transportation controls, including a vehicle inspection program, retrofitting, traffic flow improvement, peripheral and restricted parking, improved mass transportation, traffic bans, staggered work hours, car pools, and reduction of truck mileage is evaluated. Traffic and air quality surveillance methods and the obstacles facing implementation of traffic controls are outlined. The air quality impact of transportation controls is estimated.
HS-013 099

TRANSPORTATION CONTROLS TO REDUCE MOTOR VEHICLE EMISSIONS IN SEATTLE, WASHINGTON. FINAL REPORT

GCA Corp.
APTD-1444
Contract EPA-68-02-0041
Report for 14 Aug-15 Dec 1972.
Environmental Protection Agency; NTIS

*Exhaust emission control, *Transportation planning, *Air quality standards, *Seattle, *Air pollution, *Vehicle mileage, *Rapid transit systems, *Parking regulations, *Retrofitting, *Traffic surveillance, *Traffic flow, *Traffic control, *Central business districts, *Car pools, *Staggered work times, *Traffic signal timing, *Vehicle age, *Carbon monoxide, *Oxidizers, *Hydrocarbons, *Environmental impact statements, *Air pollution measurement, *Seasons, *Instrumentation, *Exhaust densities, *Time of day, *Driver aid systems, *Peak hour systems, *Traffic volume, *Forecasting,

Methods of controlling carbon monoxide and oxidant emissions to meet 1977 air quality standards in Seattle are presented. The contribution of vehicle miles of travel to air pollution is emphasized. The effectiveness of suggested transportation controls, including mass transit, fringe parking, retrofitting, gaseous conversion, traffic surveillance and control, bypassing through traffic in downtown, driver advisories, car pools, staggered work hours and days, improved signal systems, and discouraging use of older vehicles, is evaluated. Surveillance methods and obstacles facing implementation of traffic controls are outlined. The air quality impact of transportation controls is estimated.
HS-013 119

TRANSPORTATION CONTROLS TO REDUCE MOTOR VEHICLE EMISSIONS IN MAJOR METROPOLITAN AREAS. FINAL REPORT

GCA Corp.
APTD-1462
Contract EPA-68-02-0041 EPA-68-02-0048
Report for 14 Aug-15 Dec 1972.
Environmental Protection Agency; NTIS

*Exhaust emission control, *Transportation planning, *Air quality standards, *Vehicle mileage, *Air pollution, *Central business districts, *Air pollution measurement, *Vehicle inspection, *Vehicle maintenance, *Retrofitting, *Federal control, *Car pools, *Parking regulations, *Bus lanes, *Buses, *Carbon monoxide, *Oxidizers, *Hydrocarbons, *Baltimore, *Boston, *Dayton (Ohio), *Denver, *Houston, *Galveston, *Los Angeles, *New York (City), *Philadelphia, *Phoenix, *Tucson, *Pittsburgh, *St. Paul, *Minneapolis, *Salt Lake City, *Spokane, *Public opinion, *Questionnaires, *Forecasting, *Seattle, *Public transportation usage,

Transportation controls have been developed to meet 1977 ambient air quality standards in Baltimore, Boston, Dayton, Denver, Houston/Galveston, Los Angeles, New York City,

Philadelphia; Phoenix/Tucson, Pittsburgh, St. Paul/Minneapolis, Salt Lake City, Seattle, and Spokane. Summaries of air pollution problems and the concomitant transportation strategies recommended for each city are presented. Limitations of control strategy analysis and methodology for estimating air quality and carbon monoxide and oxidant concentrations are discussed. The control measures considered include Federal emission control requirements for new cars, inspection/maintenance programs, retrofitting, gaseous fuels conversion, and reduction of vehicle mileage. Obstacles facing implementation of new car standards, vehicle inspection and maintenance, retrofit of pre-1968 cars, vehicle use reduction, car pooling, peripheral parking, improved bus transportation, and long term planning measure are outlined.
HS-013 120

THE QUEST FOR A CLEAN MACHINE. THE ROTARY REVOLUTION

For primary bibliographic entry see Fld. 5D.
HS-013 140

BUS AND TRUCK TRANSPORT HAS A POSITION ON... AUTOMOTIVE EMISSION STANDARDS

V49 N4

Bus and Truck Transport v49 n4 p19-37 (Apr 1973)

*Exhaust emission control, *Vehicle air pollution, *Exhaust emission standards, *Canada, *United States, *Exhaust emission control device maintenance, *Exhaust emission control costs, *Air pollution effect on health, *Carbon monoxide, *Hydrocarbons, *Nitrogen oxides, *Clean Air Act of 1970, *Exhaust emission tests, *Air pollution control device inspection, *Federal control, *Automotive industry, *Air pollution research, *State laws, *Benefit cost analysis, *Fuel consumption, *Catalytic converters, *Thermal reactors, *Wankel engines, *Gas turbine engines, *Stratified charge engines, *Retrofitting, *Durability, *Compliance, *Air quality control regions,

The United States' 1975-76 automotive emission standards are criticized. It is contended that these standards are based more on inadequate research, assumptions, and exaggeration than on fact or necessity. It is suggested that emission standards be frozen at 1973 levels until researchers have a chance to show what more, if anything, is needed to improve the air quality. The air pollution situation in Canada is reviewed and the Canadian federal government is urged not to adopt the U. S. standard. Emission control devices including catalytic converters, stratified charge engines, thermal reactors, gas turbine engines, and the Wankel engine are briefly described and evaluated, Problems in implementing the 1975-76 standards as indicated in the U. S. National Academy of Sciences' report are mentioned;
HS-013 141

EFFECT OF FUEL FRONT-END AND MIDRANGE VOLATILITY ON AUTOMOBILE EMISSIONS

Bureau of Mines
B. H. EcclestonR. W. Hurn RI-7707; PB-214 054
Contract CRC-APRAC-CAPE-4-68
NTIS

*Fuel volatility, *Carburetor emissions, *Fuel tank emissions, *Exhaust emission sampling, *Hydrocarbons, *Aldehydes, *Ethylene, *Olefins, *Carbon monoxide, *Vehicle age, *Compact automobiles, *Ambient termperatures effect on exhaust, *Nitrogen oxides, *Evaporative emission control devices, *Evaporative emmission control, *Vapor pressure, *Emmission tests, *Photochemical reactions, *Molecular weight, *Exhaust emission reactivity, *Evaporative emission measurement,

Fuel volatility influences evaporative emissions, with the higher losses associated with higher volatility. Fuel front-end olefin contributes significantly to reactivity of emissions. Large vehicle-to-vehicle differences were found. Fifteen 1968-70 model autos and eight fuels were tested at ambients varied between 20 and 95 degree F. Data on emissions from each vehicle/fuel/temperature combination are presented. Also included are calculated photochemical reactivity data and the distribution of hydrocarbons and nitrogen oxides during the test cycle.
HS-013 156

A SYSTEMS APPROACH TO VEHICLE EMISSION CONTROL

Du Pont de Nemours (E. I.) and Co.
E. N. CantwellR. A. HoffmanI. T. RosenlundS. W. Ross SAE-720510
Presented at National Automobile Engineering Meeting, Detroit, 22-26 May 1972.
SAE

*Exhaust emission control, *Exhaust emission standards, *Exhaust gas recirculation, *Exhaust system design, *Exhaust manifold reactors, *Thermal reactors, *Experimental vehicles, *Exhaust emission measurement, *Vehicle performance, *Fuel economy, *Durability, *Engine wear, *Corrosion prevention, *Corrosion inhibitors, *Alloys, *Exhaust emission tests, *Dynamometers, *Engine tests, *Durability tests, *Temperature endurance tests, *Hydrocarbons, *Nitrogen oxides, *Carbon monoxide, *Compression ratio,

Exhaust manifold thermal reactors, exhaust gas recirculation, exhaust particulate trapping systems, and appropriate engine adjustments have been combined to produce passenger vehicle emission control systems. The first generation system met former U.S. and California 1975 emission standards, but vehicle performance and fuel economy were decreased and valve train component wear was increased. In their present state of development second generation total emission control systems produce very low exhaust emission levels; the hydrocarbons are well below the standards and the carbon monoxide and nitrogen oxide levels are quite close to the 1975-1976 standards. Emissions may be further reduced by modulating air injection and exhaust gas recirculation rates. Fuel economy can be improved by increasing the compression ratio.
HS-013 159

THE MILLION DOLLAR RACE FOR THE POLLUTION-FREE CAR

V37 N3
W. L. Roper
43-4, 46-7, 50-1 (May 1973) N V37 N3 P6-8, 40-1,

*Rotary engines, *Steam engines, *Batteries, *Wankel engines, *Catalytic converters, *Automobile engines, *Automotive industry, *Air pollution control, *Electric vehicles, *Natural gas automobiles,

Rotary, steam, and electric alternatives to the internal combustion engine are surveyed. Advantages and disadvantages of experimental bus and fleet vehicles are given.
HS-013 161

5I. Inspections

STANDARDIZATION OF AUTOMOTIVE DIAGNOSTIC SYSTEMS. INTERNATIONAL CONGRESS ON AUTOMOTIVE SAFETY (1ST) JULY 17-19, 1972

National Motor Vehicle Safety Advisory Council

NTIS

*Automated inspection systems, *Automated inspection equipment, *Vehicle inspection, *Standardization, *Diagnostic centers, *Electronic monitoring systems, *Computerized tests methods, *Sensors, *Engine diagnostic equipment, *Vehicle maintenance, *Wheel alignment, *Headlamp aiming, *Repair industry, *Inspection procedures, *Flow charts, *Benefit cost analysis, *Exhaust emission tests, *Safety laws, *Vehicle safety standards, *Federal role, *Systems analysis, *Diagnostic equipment,

The Congress was comprised of five sessions: system concepts, candidate automotive systems for diagnosis, diagnostic techniques, standardization of automotive diagnostic systems, and future diagnostic programs. The participants represented all aspects of the regulation, production, and utilization of the automobile. General information on the National Motor Vehicle Safety Advisory Council, general safety laws, and the legislative history of standardization of automotive diagnostic systems is included.
HS-820 212

5J. Lighting Systems

SHOULD REAR LIGHTS OF MOTOR VEHICLES BE COLOR CODED?

V1 N2
T. H. ProjectorK. G. Cook
Journal of IES v1 n2 p135-42 (Jan 1972)

*Rear lamps, *Color coding, *Visibility, *Colored lamps, *Color perception, *Vision, *Photometry, *Light transmission, *Contrast, *Environmental factors, *Vision disorders, *Amber taillamps, *Green taillamps, *Red lamps,

In an effort to reduce rear end collisions, the adoption of color coded vehicle rear lighting has been proposed. In evaluating the effectiveness of color coded lamps, related aspects of scotopic vision and the photochromatic interval; photometry of colored light signals; signal colors; eye sensitivity to colored signal lights; filter transmittances; selective transmission; color contrast; desaturation of colors in haze and fog; and defective vision were studied. It was concluded that color coding should not be used in the near future as a means of transmitting information in motor vehicle rear signal systems. Red is a good signal color in almost all traffic situations, and a superior color in many important ones, particularly in daylight and in fog. Adding other colors to the rear signal system could result in confusion in complex traffic, both in a fully standardized situation when all vehicles have it, and during an interim period when there would be a mix of color coded and all-red systems.
HS-013 103

COMPUTER DESIGN OF AUTOMOTIVE LAMPS WITH FACETED REFLECTORS

V2 N1
R. J. DonohueB. W. Joseph
Journal of IES v2 n1 p36-42 (Oct 1972)

*Vehicle lighting, *Lighting design, *Computerized design, *Reflectors, *Fog lamps, *Light transmission, *Brightness, *Glare reduction, *Cylinders, *Prototypes, *Light scattering,

In many automotive lamp designs a paraboloidal reflector directs images of a light source (filament) toward a fluted lens which shifts and spreads these images to form a prescribed pattern. A design concept is described in which the reflector is divided into segments (facets) in such a manner that the reflector alone produces the pattern and lens fluting is eliminated. The optical prescription for these facets was generated with computer programs which simulate the light images from each facet and builds-up the desired light pattern. Although a fog lamp design is outlined wherein the reflector elements were simple circular cylinders the computer aided optical design concept can be applied to head lamps, driving lamps, and signal lamps.
HS-013 106

MONETARY VALUES DRIVERS PLACE ON COMFORT IN NIGHT DRIVING

V2 N2
R. N. SchwabD. SolomonJ. F. Lyons
Presented at the Illuminating Engineering Society Annual Conference, Tulsa, 24-27 Jul 1972; Summary of HS-012 544.
Journal of IES v2 n2 p104-12 (Jan 1973)

*Headlamp glare, *Night driving, *Comfort, *Driver age, *Consumer preferences, *Polarized headlamps, *Driver characteristics, *Glare tolerances, *Driver attitudes, *Low beamed headlamps, *High beamed headlamps, *Lighting equipment costs,

The amount drivers are willing to pay for additional comfort resulting from substantial decrease in glare from oncoming headlamps is reported. While driving on a test track at night with controlled exposure to oncoming traffic, 24 drivers were required to choose between three headlighting systems with varying monetary values subtracted from their pay. The headlighting systems included a high glare system--conventional high beams, and two low glare systems--conventional low beams, and high intensity polarized beams. Results of the study show that drivers over age 47 were willing to pay mean value of 23 to 40 cents per hour for low glare headlights when a high glare system was free. Drivers under age 29, who were less sensitive to the effects of glare, were willing to pay only 13 to 16 cents per hour; These amounts approximate the estimated cost of a polorized headlighting system which would produce the additional comfort and visibility.
HS-013 126

5K. Maintenance And Repairs

STANDARDIZATION OF AUTOMOTIVE DIAGNOSTIC SYSTEMS. INTERNATIONAL CONGRESS ON AUTOMOTIVE SAFETY (1ST) JULY 17-19, 1972

National Motor Vehicle Safety Advisory Council
For primary bibliographic entry see Fld. 5I.
HS-820 212

5N. Occupant Protection

CONTROL LASER DRIVER AIR BAG TESTS

Calspan Corp.
D. J. Romeo CAL-ZM-5220-K
Prepared for Control Laser Corp.
Corporate author

*Air bag restraint systems, *Restraint system tests, *Acceleration response, *Anthropometric dummies, *Chest acceleration tolerances, *Head acceleration tolerances, *Femurs, *Impact sleds, *Severity indexes, *Accelerometers, *Test facilities, *Data acquisition, *Loads (forces), *Time factors, *Velocity,

A five-run sled test program was conducted to obtain anthropometric dummy test data using a compact driver air bag system. All tests were run at a sled velocity of 32 mph using an instrumented 50th percentile Sierra dummy seated with a lap belt in a 1971 Chevrolet B body test buck. In all tests bag deployment occurred later than was anticipated initially. The probable reason for late deployment was the difference between the body buck acceleration pulse, which the sensor experienced during the sled tests, and the more abrupt acceleration pulse the sensor would experience during vehicle front end crush in an actual crash. Despite late bag deployment, dummy chest accelerations were tolerable in all tests and head accelerations tolerable in four of the five tests. The tolerable results are attributable to the operation of the air bag in conjuction with a collapsible steering column and a lap belt restraint.
HS-013 105

THE EFFECTIVENESS OF HEAD RESTRAINTS IN REAR END IMPACTS. FINAL REPORT

Rochester Univ.
J. D. StatesJ. C. Balcerak BL-1
Contract DOT-HS-167-2-261
Report for 17 Jan 1972-16 Apr 1972.
NTIS

*Head restraints, *Restraint system effectiveness, *Rear end collisions, *Injury prevention, *Rochester (New York), *Whiplash injuries, *Head restraint design, *Reviews, *Data acquisition, *Multidisciplinary teams, *Trilevel accident investigation, *Head restraint caused injuries, *Injury research, *Accident rates, *Animal experiments, *Head restraint usage, *Injury factors, *Female injuries, *Male injuries, *Data analysis, *Injury rates, *Accident statistics, *Accident report forms, *Questionnaires,

All of the rear end impact accidents occurring in Rochester, New York in a three month period were surveyed by tabulation of police accident reports. Special police information forms, telephone interviews, and mail questionnaires were used for further data acquisition. During the data collection period 691 rear end impacts occurred. Whiplash injury frequency based on telephone interview and mail questionnaire data obtained one to seven days after the accident revealed a whiplash injury frequency of 38% which was approximately twice that determined by on-scene police investigators. Head restraints reduced whiplash injury frequency by 14% and fixed head restraints appeared to be more effective. Seventy percent of adjustable head restraints were in the downmost position. Women sustained whiplash injury more frequently (51%) but benefited more from head restraints (whiplash injury frequency 38%). An extensive review of the literature related to whiplash injury and head restraint design and effectiveness is also presented.
HS-800 877

5O. Propulsion Systems

CONDENSER AND FAN DEVELOPMENT FOR AUTOMOTIVE RANKINE CYCLE ENGINES. QUARTERLY PROGRESS REPORT

AiResearch Mfg. Co.
D. W. Graumann 72-8095 (1); PB-214 5
Contract EPA-68-01-0407
Report for 10 Nov 1971-31 Jan 1972.
NTIS

*Rankine cycle engines, *Steam condensers, *Fans, *Heat exchangers, *Air flow, *Test facilities, *Air pressure, *Vapor pressure, *Fan noise, *Condensation, *Cooling systems, *Heat transfer,

Condenser size and cooling air power required for Rankine cycle power plants have been a significant factor in limiting the applicability of this type of power plant for automobiles. The goal of this study is to develop preprototype condenser, duct, and fan packages for each of the three Rankine cycle automotive power plants now under development. The study will involve several tasks including the further optimization of the air-side perforated fin, the measurement of condensing coefficients, the optimization of the cooling system installation, and the design, fabrication, and testing of the fans and condenser. Progress in each task during the first quarterly reporting period is summarized.
HS-013 131

THE MILLION DOLLAR RACE FOR THE POLLUTION-FREE CAR

For primary bibliographic entry see Fld. 5F.
HS-013 161

5R. Steering Control Systems

TRUCK SPRING FUNDAMENTALS

Society of Automotive Engineers, Inc.
SAE-SP-376
Includes HS-013 108--HS-013 111.
SAE

*Spring design, *Suspension system spring rates, *Suspension systems, *Truck design, *Springs, *Vehicle riding qualities,

The design, development, and application of rubber springs, variable rate leaf springs, two-stage multileaf springs, and pneumatic springs are discussed.
HS-013 107

RUBBER SPRINGS

Chalmers Suspensions International Ltd.
W. G. Chalmers SAE-730270
(SAE-SP-376), New York, 1973 pl-6 entals

*Spring design, *Rubber, Durability, *Vehicle riding qualities, *Suspension systems, *Commercial vehicles, *Performance tests, *Durability tests, *Spring damping, *Hysteresis, *Suspension system spring rates, *Roll, *Pitch, *Deflection,

Design, development, and application of a compression type 100% rubber spring has proved to be very successful on single and tandem axle suspensions for trucks and trailers. Among the objectives of the rubber spring were a free height, not to exceed eight inches, static capacity of approximately 20,000 lb., a load deflection of about three inches, and a life of 500,000 miles or more. Desirable characteristics have proved to be smooth ride due to low frequency of pitch, minimum of side sway or roll, and long life--no spring has yet worn out despite hundreds of thousands of miles of service.
HS-013 108

VARIABLE RATE LEAF SPRINGS--THEIR DESIGN AND CHARACTERISTICS

F. Rowland SAE-730271
(SAE-SP-376), New York, 1973 p7-18 ntals

*Leaf springs, *Spring design, *Suspension system spring rates, *Deflection, *Loads (forces), *Vehicle riding qualities, *Stiffness, *Camber, *Moments of inertia, *Equations, *Truck design, *Stress analysis,

The design analysis for a variable rate spring, simplified by using an example which is symmetrical, is presented. In order for the variable rate spring to produce the desired ride qualities, specifications must establish rate curves--load and load height for the first, and also for the second, stages. Variable rate springs have the potential of improved ride quality over a wide load range, provided an adequate total deflection can be accommodated on the vehicle and the springs are designed correctly, with specifications which include control for manufacturing to obtain desired spring rates.
HS-013 109

TWO-STAGE MULTILEAF SPRING DESIGN

General Motors Corp.
J. Mikaila SAE-730272
(SAE-SP-376), New York 1973 p19-32 ntals

*Leaf springs, *Spring design, *Suspension system spring rates, *Stress analysis, *Deflection, *Loads (forces), *Moments of inertia, *Thickness, *Equations, *Mathematical analysis,

The exact method for designing a two-stage leaf spring is described. The spring consists of a multileaf first stage, and tapered-leaf second stage. Using this method, the following can be determined: spring rates and stresses when all physical dimensions are known and leaf thickness and stresses for given rates. A sample of a step-by-step calculation is given.
HS-013 110

PRINCIPLES AND APPLICATION OF PNEUMATIC SPRINGS

Goodyear Tire and Rubber Co.
A. B. Hirtreiter SAE-730273
(SAE-SP-376), New York 1973 p33-7 entals

*Spring design, *Suspension systems, *Air pressure, *Pneumatic springs, *Spring rates, *Manufacturing, *Gas dynamics, *Compression,

This paper is a review of the SAE Manual on the Principles and Application of Pneumatic Springs. Basic principles, types, applications, special cases, and associated equipment are outlined. General capabilities and limitations of pneumatic springs and the production of these spings are also discussed.
HS-013 111

EFFECT OF VEHICLE SUSPENSION ON WET TIRE TRACTION TESTING

V1 N2
P. L. Boyd
1973) Science and Technology v1 n2 p152-71 (May

*Suspension system design, *Tire traction, *Tire pavement interface, *Wheel locking, *Cornering, *Wet skidding, *Rear suspension systems, *Deceleration, *Lateral acceleration, *Accelerometers, *Tethered tests, *Wet road conditions,

A pair of intermediate size sedans of each of the three suspension types was put through constant radius cornering and straight stopping maneuvers on wet pavements. All cars used the same original equipment tire design. Speed and acceleration were measured. All three suspension types gave equivalent cornering performance and only slight differences in stopping deceleration. However, the vehicles with rear suspensions consisting of coil springs and control arms were more suitable for sudden lockup stopping because they were less prone to a severe transient condition known as wheel hop.
HS-013 146

5T. Trucks And Trailers

MOTOR CARRIER ACCIDENT INVESTIGATION. TRIANGLE PACIFIC CABINETS, INC. ACCIDENT--FEBRUARY 22, 1972--HUBBARD, OHIO

Bureau of Motor Carrier Safety
For primary bibliographic entry see Fld. 1C.
HS-013 100

MOTOR CARRIER ACCIDENT INVESTIGATION. CONSOLIDATED FREIGHTWAYS CORPORATION ACCIDENT-- NOVEMBER 18, 1972--PORTLAND, OREGON

Bureau of Motor Carrier Safety
For primary bibliographic entry see Fld. 1C.
HS-013 101

MOTOR CARRIER ACCIDENT INVESTIGATION. O'NAN TRANSFER COMPANY ACCIDENT--SEPTEMBER 28, 1972--JONESBORO, TENNESSEE

Bureau of Motor Carrier Safety
For primary bibliographic entry see Fld. 1C.
HS-013 102

TRUCK SPRING FUNDAMENTALS

Society of Automotive Engineers, Inc.
For primary bibliographic entry see Fld. 5R.
HS-013 107

RUBBER SPRINGS

Chalmers Suspensions International Ltd.
For primary bibliographic entry see Fld. 5R.
HS-013 108

VARIABLE RATE LEAF SPRINGS--THEIR DESIGN AND CHARACTERISTICS

For primary bibliographic entry see Fld. 5R.
HS-013 109

ELECTRIC TRAILER BRAKES

Kelsey-Hayes Co.
For primary bibliographic entry see Fld. 5A.
HS-013 113

THE DEVELOPMENT OF WRITTEN EXAMINATIONS ON THE MOTOR CARRIER SAFETY REGULATIONS. FINAL REPORT

Richardson, Bellows, Henry and Co., Inc.
For primary bibliographic entry see Fld. 3F.
HS-013 154

5V. Wheel Systems

RECENT STUDIES OF TIRE BRAKING PERFORMANCE

V1 N2
J. L. McCartyT. J. W. Leland
Presented at the American Society for Testing and Materials Com. F-9 Symposium on Tire Traction, Lanham, Md., 10 May 1972.
1973) Science and Technology v1 n2 p121-37 (May

*Antiskid brakes, *Tire brake force, *Braking, *Cornering, *Aircraft tires, *Coefficient of friction, *Runway surfaces, *Wheel slip, *Tire wear, *Wheel locking, *Deceleration tests, *Tire performance, *Tire temperature, *Wet road conditions, *Dry road conditions, *Tire traction, *Vehicle handling, *Drag,

Results of recent studies of some factors affecting tire braking and cornering performance are presented and the possible application of these data to the design of aircraft braking systems is discussed. In the tests conducted at fixed slip ratios, it was shown that braking in excess of that required to develop maximum braking coefficient resulted in markedly increased tire war. The combined steering and constant-braking tests showed a significant loss in cornering force with brake application on a damp surface and total loss in cornering force with light braking on a flooded surface. In the cyclic braking tests the maximum force coefficients were poorly defined, especially on the wet surface; and pronounced differences in the instantaneous force coefficient-slip curves were observed between the steady-state and the rapid cycle braking conditions imposed by an operational antiskid system. The response of the antiskid braking system was shown to be deficient when the tire passed over surfaces of sharply different surface character.
HS-013 144

A DIAGONALLY BRAKED VEHICLE FOR THE INVESTIGATION OF TIRE TRACTION

V1 N2
T. J. Yager
Presented at the American Society for Testing and Materials Com. F-9 Symposium on Tire Traction, Lanham Md., 10 May 1973.
1973) Science and Technology v1 n2 p138-51 (May

*Tire traction, *Aircraft tires, *Braking, *Stopping distance, *Tire tests, *Runways, *Tire road conditions, *Wet road conditions, *Coefficient of friction, *Pavement surface texture, *Grooving, *Dry road conditions, *Asphalt pavements, *Icy road conditions, *Pavement friciton, *Chemical treatment, *Pneumatic tires, *Tire pavement interface, *Performance tests, *Brake performance, *Fifth wheel devices, *Tire characteristics,

The development and application of a diagonally braked vehicle test technique has yielded insights into factors known to affect pneumatic tire traction such as certain tire parameters (including size, construction, and tread pattern) and pavement properties (including surface finish and the type and extent of contamination). The effects of tire and surface characteristics on available traction are reviewed. The application of test results to the estimation of aircraft stopping performance under low traction conditions, and possible future application of the diagonally braked vehicle are discussed;
HS-013 145

EFFECT OF VEHICLE SUSPENSION ON WET TIRE TRACTION TESTING

For primary bibliographic entry see Fld. 5R.
HS-013 146

RESEARCH ON WET TIRE TRACTION

V1 N2
Jr., A. H. NeillP. L. Boyd
Presented at American Society for Testing and Materials Com F-9 Symposium on Tire Traction, Lanham, Md., 10 May 1972.
1973) Science and Technology v1 n2 p172-89 (May

*Tire traction, *Tire pavement interface, *Tire grading, *Wet road conditions, *Tire tests, *Cornering, *Deceleration tests, *Tire performance, *Skid resistance tests, *Coefficient of friction, *Tire tread depths, *Lateral acceleration, *Tire road conditions, *Suspension systems, *Rim widths, *Radial tires, *Bias tires, *Bias belted tires, *Stopping distance, *Deceleration, *Tire test equipment, *Tire force measurement, *Tire skid resistance,

Experiments and methodology employed in an attempt to develop a system for the grading of wet tire traction are described. Data from instrumented vehicle experiments and the University of Michigan Highway Safety Research Institute mobile tire tester are used to support the conclusions. The vehicle tests included J-curve cornering and diagonal, locked-wheel braking. The maneuvers were used to generate information on tire tractive properties and their dependence on tread depth, rim size, suspension, and surface conditions. Three tire force measures obtained with the mobile tire tester, the peak longitudinal, peak free-rolling lateral, and locked wheel longitudinal coefficents of friction, are presented for a group of 90% of the original equipment tire sizes in use on American cars and are rank correlated with vehicle results. The results indicate the feasibility of defining minimum wet traction levels for various tire road interface properties.
HS-013 147

IMPROVEMENT OF TIRE TRACTION WITH CHLOROBUTYL RUBBER

V1 N2
C. Keller

Presented at the American Society for Testing and Materials Com. f9 Symposium on Tire Traction, Lanham, Md., 10 May 1972
1973) Science and Technology v1 n2 p190-201 (May

*Tire traction, *Tire skid resistance, *Butyl tires, *Tire materials, *Rubber compounds, *Tire tests, *Skid resistance tests, *Tire treads, *Tire performance, *Hysteresis, *Falling ball tests, *Pendulum tests, *Tire loads, *Loading (mechanical), *Coefficient of friction, *Wet road conditions, *Tire wear resistance, *Tire road conditions, *Carbon black, *Tire resilience, *Proving ground tests, *Pavement surface texture, *Retreaded tires,

Tire skid resistance can be improved with tread compounds which have high hysteresis losses. Chlorobutyl rubber is a chlorinated isobutylene-isoprene copolymer of interest in tread compounds because of its high damping (low resilience) characteristics. The traction of tread stocks containing blends of chlorobutyl and SBR has been evaluated in laboratory and tire tests. Traction performance is estimated using the portable skid resistance tester as well as the classical rebound tests. The influence of the composition of the polymer blend and carbon black loading on the skid properties of the tread compound is discussed. Tire traction performance is determined with an automated vehicle designed to measure peak and sliding skid resistance. Significant improvements in traction performance have been found for radial tires with chlorobutyl-containing tire treads; the level of improvement is directly proportional to the chlorobutyl content of the polymer blend. Some loss in treadwear appears unavoidable, however.
HS-013 148

ENVIRONMENTAL EFFECTS ON TIRE TREADWEAR

V1 N2
R. H. Snyder
Presented in part at the International Rubber Study Group Meeting (22nd), Ottawa, Canada, 21 Sep 1971.
1973) Science and Technology v1 n2 p202-9 (May

*Tire wear, *Tire treads, *Tire wear resistance, *Weibull density functions, *Service life, *Vehicle mileage, *Tire temperature tests, *Environmental factors, *Maps,

Statistical studies on treadwear of contemporary belted tires, on a nationwide basis, demonstrate that in any given locality wide differences are to be expected in the performance of individual tires. The best and worst ten-percentile groups exhibit a twofold variation. Different geographical regions are shown to permit wide variations in treadwear behavior. Contour maps are presented which show treadwear patterns.
HS-013 149

ADVANCES IN TIRE COMPOSITE THEORY

V1 N2
J. D. WalterG. N. AvgeropoulosM. S. JanssenG. R. Potts
Presented as part of the Akron Rubber Group Lecture Series, 13 Mar 1972.
1973) Science and Technology v1 n2 p210-50 (May

*Pneumatic tires, *Tire cords, *Tire materials, *Rubber compounds, *Tire ply number, *Modulus of elasticity, *Poisson density functions, *Stress strain characteristics, *Shear modulus, *Twisting, *Stiffness, *Shear stress, *Bias tires, *Bias belted tires, *Radial tires, *Deformation, *Rigidity, *Tire pavement interface, *Tire treads, *Tire wear resistance, *Tire vibration, *Tire spring rates, *Tire shape, *Bending, *Tire inflation pressure, *Elasticity, *Mathematical analysis,
Fundamentals of composite material technology are applied to the investigation of multiply cord-reinforced rubber systems as used in pneumatic tires. The stiffness parameters of such multiply systems are determined through the use of the elastic properties of the constituent cord and rubber components. The effects of coupling between the bending and stretching modes of deformation are discussed along with the limitations of present composite material technology as applied to soft rubbery systems. The predicted stiffness parameters are related to tread wear, obstacle envelopment, vibration, and streee analysis of tires.
HS-013 150

TIRE TEST

V18 N12

Car and Driver v18 n12 p43-55 (Jun 1973)

*Tire tests, *Tire performance, *Wet road conditions, *Dry road conditions, *Braking, *Cornering, *Tire traction, *Radial tires, *Tire rolling resistance, *Skid pan tests, *Tire characteristics, *Acceleration,

Fifteen G-size tires made for American sports cars and intermediate sedans were tested for wet and dry braking, wet and dry cornering, acceleration traction, and rolling resistance. Tire performance scores are presented for each test. The four highest scoring tires were 70-series radials.
HS-013 166

DOT–HS–042–3–783

LABORATORY TEST PROCEDURES

Ogden Technology Lab., Inc.
1536 East Valencia Drive
Fullerton, California 92631

$54,405

This modification provides for testing of passenger vehicles and buses in accordance with FMVSS 214, 216, and 217.

DOT–HS–027–3–785

LABORATORY TEST PROCEDURES

General Environments Corp.
6840 Industrial Road
Springfield, Virginia 22151

$82,565

Testing passenger vehicles and buses in accordance with FMVSS 214, 215, 216, and 217.

DOT–HS–046–3–784

LABORATORY TEST PROCEDURES

Dynamic Science,
Division of Ultrasystems, Inc.
1850 W. Pinnacle Peak Road
Phoenix, Arizona 85027

$59,272

Testing passenger vehicles in accordance with FMVSS 208, 212, and 301.

DOT–HS–066–3–782

LABORATORY TEST PROCEDURES

Agbabian Associates
250 North Nash Street
El Segundo, California 90245

$36,900

Testing passenger vehicles in accordance with FMVSS 208, 212, and 215.

DOT–HS–088–3–751

STRESS ANALYSIS AND STRAIN GAGE TESTS FOR SINGLE PIECE WHEELS

Material Research Laboratory
One Science Road
Glenwood, Illinois

27 June 73 to 31 Dec 73

$74,937.69

Strain gage tests and stress analyses will be made for passenger car and pickup truck wheels supplied by NHTSA. Wheels are examined to assure that no crack initiation has occurred. Strain gage checks will be made under a number of conditions and selected data used for dynamic tests. Strain readings are used to determine the influence of bolt loading with a zero radial load. On the basis of the strain data, road tests will be made under controlled conditions and a stress analysis performed.

DOT–HS–256–3–752

FEASIBILITY STUDY OF IN-VEHICLE WARNING SYSTEMS

Tracor/Jitco, Inc.
1300 E. Gude Drive
Rockville, Maryland 20851

26 June 73 to 28 June 74

$66,200

A study will be made to determine if an in-vehicle warning system is a feasible accident avoidance countermeasure, and if feasible, to determine what the performance requirements should be for the system to be feasible and cost effective. The characteristics typical of grade crossings and emergency vehicle accidents will be analyzed, performance objectives, and criteria of system effectiveness. It will then be determined if an appropriate system design can be developed. Recommendations will then be made concerning the desirability of implementing the in-vehicle approach.

DOT–HS–031–3–749

VALIDATION STUDIES FOR HEAD IMPACT INJURY MODEL

The University of Michigan
260 Research Administration Building
Ann Arbor, Michigan 48105

26 June 73 to 30 June 74

$78,950

A study will be made involving experiments using the heads of animals and cadavers to validate an analysis model for various impact situations. The plan of work and methodology specified by NHTSA will be refined and expanded, and a series of tests will be conducted under various controlled conditions.

DOT–HS–256–3–755

PASSENGER VEHICLE AND LIGHT TRUCK SHOCK ABSORBER INSPECTION EQUIPMENT

Tracor/Jitco, Inc.
1300 E. Gude Drive
Rockville, Maryland 20851

26 June 73 to 28 June 74

$62,989

Research will be undertaken to determine the important shock absorber parameters, with respect to safety, and the range of these parameters in the passenger vehicle shock absorber population. Each type of shock absorber will be tested to determine its effectiveness with respect to certain critical shock absorber parameters. Literature will be gathered and synopsized, a test methodology and test plan developed, and tests conducted. The resulting data will be analyzed according to specifications provided by NHTSA.

DOT–HS–107–3–696

TRAFFIC LAWS ANNOTATED

National Committee on Uniform Traffic Laws and Ordinances

1776 Massachusetts Avenue, N.W.
Suite 430
Washington, D.C. 20036

25 June 73 to 25 June 74

$50,000

Three hundred copies of an annual supplement to *Traffic Law Annotated* (1972) will be researched, prepared, and delivered to NHTSA. A traffic laws commentary entitled "Rules of the Road Rated" will be researched, prepared and delivered to NHTSA, as well as 90 copies of the agendas used by the various working subcommittees of the National Committee on Uniform Traffic Laws and Ordinances (MTO).

DOT–HS–031–3–693

VEHICLE-IN-USE LIMIT PERFORMANCE AND TIRE FACTORS

The Regents of the University of Michigan
Administration Building
Ann Arbor, Michigan 48104

25 June 73 to 31 Dec 74

$279,380

Research will be undertaken to develop a data base of critical tire factors and degradation levels which are needed to refine and update vehicle safety inspection criteria. A survey will be made to acquire, organize, and synopsize existing information on the tasks involved in the research, and a test methodology and test plan will be developed. Tire performance characteristics will be determined, the effects on vehicle performance limits determined, and field verification tests made of the simulation results. The experimental results will be analyzed by methods that will clearly demonstrate the effect of important tire test parameters on vehicle stability and control.

DOT–HS–123–3–750

DESIGN OF A STUDY TO ASSESS THE IMPACT OF FEDERAL THEFT PROTECTION STANDARDS

Arthur Young and Company
1025 Connecticut Ave., N.W.
Washington, D.C. 20036

25 June 73 to 24 Nov 73

$15,880.69

A study will be designed and planned to assess the impact of FMVSS No. 114 on highway safety. Study concepts will be designed, alternate study designs will be developed, and a fully implementable study design and plan of execution will be developed for the selected alternative. This plan will include complete data specifications, systems and forms for data recording, collection and analysis. The plan will include complete time-sequenced task specifications for all aspects of the study and a plan for administrative monitoring of its progress.

DOT–HS–333–3–644

AUTOMOTIVE TAPE RECORDER CRASH TEST

AVCO Corporation
AVCO Systems Division
201 Lowell Street
Wilmington, Massachusetts 01887

24 Apr 73 to 23 Oct 73

$3,688

One GFE tape recorder will be installed in each of three vehicles for crash tests to be run. There sensor and accelerometer package will be installed under the left front seat on the same base plate as the triaxial accelerometer. After each test the tape recorder and transducer package will be removed and the tape record reduced. The acceleration data will be integrated to provide velocity curves.

DOT–HS–090–2–477

WEAVER PLATFORM BRAKE TESTER

The Bendix Corporation
Research Laboratories
20800 Ten and One-Half Mile Road
Southfield, Michigan 48076

Extended to 13 August 73

$7,451

This modification provides for an increase in the scope of work of the original contract. The additional effort consists of physical tests and evaluations of two additional vehicle brake test devices.

DOT–HS–053–3–664

PERFORMANCE EVALUATION OF NEW GENERATION NHTSA 50TH PERCENTILE DUMMY

Calspan Corporation
P.O. Box 235
Buffalo, New York 14221

28 June 73 to 27 Aug 74

$187,488

The sensitivity of dummy dynamic responses to variations in the dummy physical properties will be investigated and analyzed, using the Calspan three-dimensional crash victim simulation computer program. The simulations will involve barrier impacts with restrained models in at least two configurations. All anthropometric measurements and all component tests will be performed as prescribed by NHTSA. Test configurations will be developed and performance characteristics of test dummies established under simulated 30-mph impact conditions . A simplified test procedure to qualify the test dummy as a compliance tool will be established and verified. Performance tests conducted at another facility will be duplicated with dummies furnished by NHTSA. Anthropomorphic and other test data will be analyzed.

DOT–HS–099–3–747

IDENTIFICATION OF COUNTERMEASURES FOR THE YOUTH CRASH PROGRAM RELATED TO ALCOHOL

Dunlop and Associates, Inc.
One Parkland Drive
Darien (Fairfield), Connecticut 06820

25 June 73 to 28 June 74

$95,200

Research will be undertaken to collect and analyze information to identify a set of countermeasures to alleviate the young driver alcohol problem. Literature relevant to this problem will be reviewed, data needs will be identified and a collection methodology developed according to criteria specified by NHTSA. Data will then be analyzed and the countermeasures identified.

DOT–HS–191–3–759

AN EVALUATION OF ALCOHOL SAFETY ACTION PROJECT (ASAP) REHABILITATION EFFORTS

University of South Dakota
Vermillion, South Dakota 57069

25 June 73 to 28 June 74

$93,444

A program will be conducted to aid in the evaluation of the rehabilitation countermeasures of the alcohol safety action projects. The program requires a review of the detailed plans and quarterly report data for 35 ASAP's, site visits to the remaining 29 ASAP's, consultation to OAC and ASAP staffs on problems in the system flow or evaluation design of the ASAP's, advice to ASAP sites on analytic studies of countermeasures, and statistical analyses of data available to OAC on rehabilitation activities.

DOT–HS–123–3–774

FACTORS INFLUENCING ASAP POLICE OFFICERS DWI ARRESTS

Arthur Young & Company
1025 Connecticut Avenue
Washington, D.C. 20036

25 June 73 to 25 Apr 1974

$48,494.35

A study will be made to identify certain productivity variables which affect police discretion at ASAP sites. Fifteen sites will be visited, the variables identified, the degree determined to which each variable influences police discretion, and ways suggested to neutralize or minimize negative variables, and to develop and strengthen positive variables.

DOT–HS–099–3–761

DEVELOPMENT OF TRAINING PROGRAM FOR EMERGENCY MEDICAL SERVICE PROGRAM ADMINISTRATION

Dunlop and Associates, Inc.
One Parkland Drive
Darien (Fairfield), Connecticut 06820

25 June 73 to 25 Sept 74

$95,364

A training program for Emergency Medical Services (EMS) will be developed to fulfill the requirements of Highway Safety Program Standard No. 11 with respect to program administration of State and local emergency medical services. A detailed project schedule will be developed, as well as a complete knowledge, skill, and behavorial specification for EMS program administration, including the terminal, instrumental, and associated performance requirements. The training objectives will be determined, and curriculum content and methodology developed. The curriculum will be organized to reflect the logic and sequence of the training program. A critique of the training program will be conducted and revisions made where necessary.

DOT–HS–053–3–658

MATHEMATICAL RECONSTRUCTION OF ACCIDENTS

Calspan Corporation
Post Office Box 235
Buffalo, New York

25 June 73 to 24 June 74

$149,494

Calibration factors will be developed for anthropomorphic dummies on the basis of injuries to living humans involved in actual highway accidents. The overall concept of using a digital computer program to process data transmitted from the accident scene and provide reconstructions of the accident crash will be field tested. Based upon this field experience, the mathematical reconstruction system will be modified and expanded as required. An initial pilot study will be made using 10 accident cases. Based on the initial findings, the dummy calibration study will be expanded as appropriate.

DOT–HS–199–3–732

STUDY OF ADVANCED ENERGY ABSORBING VEHICLE STRUCTURES BY SCALE MODELING TECHNIQUES

Stanford Research Institute
333 Ravenwood Avenue
Menlo Park, California 94025

25 June 73 to 24 June 74

$97,887

Scale modeling techniques will be evaluated for their application to automobile structures. The techniques will be applied to the frontal structures of subcompact cars and additionally to support vehicle structures standards recommendations. The study will be in two phases. The first phase will be a feasibility study to determine the application of scale modeling techniques to automotive structures. If the conclusions in Phase I are favorable, Phase II will embody a program expanding scale modeling techniques for studying automobile crashes and for evaluating energy absorbing systems.

DOT–HS–099–3–760

TRAINING STATE AND COMMUNITY INSTRUCTORS IN USE OF NHTSA CURRICULUM PACKAGE: POLICE TRAFFIC SERVICES—SUPERVISOR

Dunlop and Associates, Inc.
One Parkland Drive
Darien (Fairfield), Connecticut 06820

25 June 73 to 26 Dec 73

$47,122

A 30-hour training course will be developed and provided to selected instructors from State and community agencies throughout the country. Instructors

will be trained to conduct the NHTSA course, "Police Traffic Services—Supervisor." The training course will be based on the U.S. Office of Education's "Preparation of Occupational Instructors: A Suggested Course Guide."

DOT–HS–115–3–753

INJURY ASSESSMENT OF BELTED CADAVERS

Wayne State University
Biomechanics Research Center
5050 Case Avenue
Detroit, Michigan 48202

25 June 73 to 30 June 74

$68,091

A study will be conducted using cadavers restrained with properly worn lap and shoulder belt combinations in order to establish an upper crash severity for which belts provide adequate crash severity. A plan of work and methodology will be developed in detail. A minimum of six valid sled impact tests will be conducted under conditions specified by NHTSA.

DOT–HS–242–2–421

AUTOMOTIVE TAPE RECORDER CRASH TEST

Systems Technology, Inc.
13766 South Hawthorne Boulevard
Hawthorne, California 90250

No change

$4,448.50

This modification provides for the installation of one GFE automotive tape recorder in accordance with NHTSA installation instructions. Baseline equipment will be installed to provide data to compare with crash recorder data.

DOT–HS–036–3–712

MODEL POLICE TRAFFIC SERVICES POLICY DOCUMENT AND MODEL PROCEDURES MANUAL FOR POLICE SERVICES

International Association of Chiefs of Police
Eleven Firstfield Road
Gaithersburg, Maryland 20760

27 June 73 to 30 June 74

$78,641

Develop a model police traffic services policy document and model procedure manual for police services as set forth in the International Association of Chiefs of Police, Inc., in a proposal dated 15 March 1973. This program includes 1 year of a 3-year program.

DOT–HS–027–1–054

HIGH SPEED PERFORMANCE TEST

General Environments Corp.
General Testing Lab
6840 Industrial Road
Springfield, Virginia 22151

27 June 73 to 10 days after test completion

$7,800

This modification provides for the addition of 120 high-speed performance tests.

DOT–HS–046–3–769

VEHICLE BRAKING SYSTEMS TESTING PROCEDURE —HYDRAULIC BRAKES

Dynamic Science Division
Ultrasystems, Inc.
1850 West Pinnacle Peak Road
Phoenix, Arizona 85027

28 June 73 to 27 Oct 73

$70,815

A test program will be conducted to refine the test procedures and test conditions specified in FMVSS No. 105a, and to establish the degree to which current-production commercial vehicles comply with the 1976 model year requirements. Technical data will be compiled on representative vehicles, and a selection made of the vehicles to be used in the tests. The vehicles will be tested following the procedures specified in FMVSS 105a with four noted exceptions.

DOT–HS–198–3–770

SPECIAL FIELD STUDY—ALCOHOL INVOLVEMENT

Maryland Medical Legal Foundation, Inc.
Office of Chief Medical Examiner of Maryland
Central Anatomic Laboratory, Department of Mental Hygiene
111 Penn Street
Baltimore, Maryland 21201

28 June 73 to 28 June 74

$99,900

A special study will be made of both driver fatalities and matched control samples of live drivers involved

in motor vehicle accidents to determine causal factors. All fatal driver collisions in a specified area in the vicinity of Baltimore, Maryland, will be investigated. Training, investigations, and the collection and analysis of data will be according to detailed specifications established by NHTSA.

DOT–HS–053–3–768

LABORATORY TESTING PROCEDURES

Calspan Corporation
4455 Genesee Street
Buffalo, New York

28 June 73 to 27 July 73

$11,515

A structural analysis will be made of the bending and torsional properties of the bifilar pendulum mechanism device used in certain demonstration tests. Appropriate modification for the device will be developed.

DOT–HS–253–3–744

TESTING FOR A SOBERING PILL

Research and Education Foundation
of Orange County Medical Center
101 City Drive South
Orange, California 92668

28 June 73 to 30 June 74

$49,500

A cursory evaluation will be made of Levodopa and other potential agents. The preliminary study will be followed by a double blind study of the most promising agents. Twelve subjects will be used and each will serve as his own control. The specific variable of interest will be the subject's responses under placebo vis-a-vis the active agent. The two covariants will be the scores of the subjects under the basal and alcohol conditions if the other two scores do not correlate highly.

DOT–HS–081–1–106–IA

COMPLIANCE TESTING TECHNIQUES

Department of Health, Education, and Welfare
National Institutes of Health
National Institute of Neurological Diseases and Stroke
Washington, D.C.

28 June 73 to 27 June 74

$35,000

This modification provides for additional work involving head-impact and knee-impact tests. The tests will include frontal impact tests under various conditions, occipital impacts, side impacts, and knee-impact tests under various specified conditions. A compendium of all impacts will be compiled showing the relationship between external force applied, internal strain observed, femoral accelerations, and resulting injury produced. A femoral tolerance criteria will be developed from the data, reflecting femur tolerance to maximum loads and strain rates if applicable.

DOT–HS–046–3–694

SCHOOL BUS SAFETY IMPROVEMENT

Dynamic Science Division
Ultrasystems, Incorporated
1850 West Pinnacle Peak Road
Phoenix, Arizona 85027

28 June 73 to 30 June 74

$299,301

A study will be made to improve the crashworthiness and accident avoidance capability of school buses. A modified bus will be submitting to handling, braking and operational tests, a racking test, a side impact barrier crash, a roof loading test, and associated component tests necessary to evaluate improvements attained in the areas of crashworthiness and accident avoidance.

DOT–HS–113–3–742

DEVELOPMENT OF ADVANCED PASSIVE RESTRAINT SYSTEM FOR SUB-COMPACT CAR DRIVERS

Minicars, Inc.
35 La Patera Lane
Goleta, California 93017

29 June 73 to 31 Dec 74

$194,664

A driver restraint system will be developed which, through energy absorption in the steering column and inflatable restraint system, will make more efficient use of the available interior distance within the subcompact car interior. The system will be based on the air bag concept, and will be capable of providing protection to drivers ranging in size from a 5th percentile female to a 95th percentile male in frontal and frontal oblique crashes up to the severity capability of the vehicle structure.

DOT–HS–090–3–710

COMPONENT DEGRATION: BRAKING SYSTEMS

The Bendix Corporation
Research Laboratories
20800 Ten and One-Half Mile Road
Southfield, Oakland County, Michigan 48076

29 June 73 to 30 June 74

$348,522

Research will be performed to determine, through vehicle testing, how selected types, degrees, and combinations of braking system component degradation affect or have a potential effect on objective and quantitative measures of vehicle braking system performance, and to recommend limits of braking performance degradation and the corresponding limits of component degradation.

DOT–HS–356–3–719

PEDESTRIAN MODEL PARAMETRIC STUDIES

Boeing Computer Services, Inc.
P.O. Box 24346
Seattle, Washington 98124

29 June 73 to 30 June 75

$142,226

An investigation will be made of optimization and sensitivity techniques which will use a highly nonlinear analytical model to determine parametric values to minimize a specified pedestrian impact protection performance criterion. The investigation will include an in-depth survey of the present state of the art and any additional analytical modification and developmental work which will result in an appropriate technique.

DOT–HS–366–3–764

CONVERSION OF MVP MASTER MATRIX TO ADP

Grumman Data Systems Corporation
Bethpage, Long Island, New York 11714

29 Oct 73 to 30 July 74

$78,373

An automatic data processing system will be developed which will perform computations now being done manually and which can periodically print out an updated display of a master matrix. The program will be developed, validated, and demonstrated on the basis of computer terminals and facilities accessible at NHTSA. In Phase I, computer programs will be developed which apply automatic data processing to operations now being performed manually and will use existing rationale, models, mathematical relationships and data to demonstrate and validate the program. Phase II of the program will seek to extend the program to take advantage of multiple data banks becoming operational and accessible to NHTSA, of forecasting tools currently under development, and to take advantage of opportunities which emerge during Phase I for optimizing the processing and display of data pertinent to decisions concerning development of motor vehicle safety standards.

DOT–HS–115–3–772

EFFECTS OF NOXIOUS GASES ON DRIVER PERFORMANCE

Ohio State University
Research Foundation
1314 Kinnear Road
Columbus, Ohio 43210

29 June 73 to 30 April 74

$77,769

Research will be initiated to determine the relationship between various safety-related aspects of driver performance and the driver's exposure to noxious gases, specifically, carbon monoxide and the oxides of nitrogen. A literature search will be made to establish the effects of typically encountered worse-case concentrations and periods of exposure of the two gases on driver performance, without regard to the source of the gases and to determine the origin of gases typically found in passenger cars. A survey will be made of noxious gas levels typically found in automobiles, and of susceptible population groups. Various tests will be conducted according to an approved research plan.

DOT–HS–368–3–778

PREDICTING SOCIETAL BENEFITS AND COSTS RESULTING FROM THE IMPLEMENTATION OF TITLE II, PL 92–513—STUDY DESIGN, PHASE I

Operations Research, Inc.
1400 Spring Street
Silver Spring, Montgomery County, Maryland 20910

29 June 73 to 31 Aug 73

$37,979

A study will be made to provide information on the beneficial and adverse consequences of Title II of the

Motor Vehicle Information and Cost Savings Act. The study will predict the nature and extent of specific economic, sociological, environmental, political, safety, and other consequences—both beneficial and adverse—on various affected groups, which result from alternative methods of accomplishing the objectives of Title II. The study will identify and describe significant socioeconomic, environmental safety, and other tradeoffs among various alternatives. The study will predict the net societal benefits or losses resulting from the implementation of selective alternative methods.

DOT–HS–367–3–777

PREDICTING SOCIETAL BENEFITS AND COSTS RESULTING FROM THE IMPLEMENTATION OF TITLE II, PL 92–513—STUDY DESIGN, PHASE I

Arthur D. Little, Inc.
Acorn Park
Cambridge, Massachusetts 02140

29 June 73 to 31 Aug 73

$30,760

A study will be made to predict the nature and extent of specific economic, sociological, environmental, political, safety, and other consequences, both beneficial and adverse, on various affected groups, which result from alternative methods of accomplishing the objectives of Title II. Significant socioeconomic, environmental safety, and other tradeoffs or alternatives will be identified and described, and the net societal benefits or losses resulting from the implementation of selective alternative methods will be predicted.

DOT–HS–008–3–624

50TH PERCENTILE HYBRID II ANTHROPOMORPHIC DUMMIES

Sierra Engineering Company
123 East Montecito Avenue
Sierra Madre, California 91024

29 June 73 to 26 Nov 73

$10,672

This modification provides for the acquisition of two 50th percentile, Hybrid II anthropomorphic dummies.

DOT–HS–113–3–746

CRASHWORTHINESS OF SUB-COMPACT VEHICLE

Minicars, Inc.
35 La Paterna Lane
Goleta, California 93017

29 June 73 to 30 Jan 75

$665,968

Crashworthy structures will be developed for sub-compact vehicles which will protect the occupants in impacts of all types in a manner which is the most cost-effective, production feasible, and weight controlled. Current and proposed structural modifications for sub-compact vehicles will be analyzed for their applicability in the highway environment. The development of impact energy absorption and/or distribution devices or concepts for sub-compact vehicles will be advanced. The improved performance capability of the developed sub-compact vehicle will be verified by testing and computer simulation under a wide range of conditions.

DOT–HS–120–3–773

EVALUATION OF ANTHROPOMETRIC COMPLIANCE TOOL

Essex Corporation
303 Cameron Street
Alexandria, Virginia 22314

29 June 73 to 31 Dec 73

$23,991

An anthropometric compliance tool will be evaluated to determine its utility as a field test instrument, to assess the reliability of the measures of the tool, and to provide recommendations for tool and installation procedure modifications if required.

DOT–HS–322–3–781

AIR CUSHION RESTRAINTS FIELD TESTS—DRIVER AIR CUSHION SYSTEMS

Eaton Corporation
Safety Systems Division
466 Stephenson Highway
Troy, Michigan 48084

29 June 73 to 30 Sept 73

$62,440

This project provides for the installation of 124 driver air cushion restraint systems, including all necessary hardware, in a fleet of vehicles furnished for this purpose.

DOT–HS–056–1–073

DRIVER LICENSING COUNTERMEASURE

The State of Arkansas
Office of the Governor
Public Safety Program
116 National Old Line
Little Rock, Arkansas 72201

No change

$98,000

The purpose of this modification is to delete portions of the original contract statement of work, and to add an additional requirement entitled "Driver Licensing Countermeasure."

DOT–HS–371–3–786

LITERATURE REVIEW, BREATH TEST STANDARDS REVIEW, CONSTITUTIONAL PROTECTION, AND WORKSHOPS

National Safety Council
425 North Michigan Avenue
Chicago, Illinois

29 June 73 to 30 June 74

$53,315

A review will be made of all technical literature published during the period July 1, 1972—June 30, 1973, that is relevant to forensic toxicology, public education, human factors, and law-related studies as they apply to the problem of alcohol and drugs in highway safety. A review will be made of three proposed standards and three qualification test reports, each covering 10 pieces of equipment. A study will be made on the constitutional protection of individuals selected to participate in special alternative sanctions after conviction for an alcohol-involved traffic offense. A plan will be developed to conduct two 3-day workshops in Europe.

DOT–HS–333–3–775

AUTOMOTIVE TAPE RECORDER—LIFE AND ENVIRONMENTAL TESTS

Avco Systems Division
201 Lowell Street
Wilmington, Massachusetts 01887

29 June 73 to 30 Jan 74

$43,000

Automotive tape recorders developed under Contract FH–11–7603 will be tested under conditions which they will experience in the field. The test environments will include, as a minimum, operating low temperature, operating high temperature, high temperature/shock, high temperature/vibration, low temperature/shock, and low temperature/vibration. A reliability prediction of the recorder will be made.

DOT–HS–323–3–622

50TH PERCENTILE HYBRID II ANTHROPOMORPHIC DUMMY

Alderson Research Laboratories, Inc.
390 Ludlow Street
Stamford, Connecticut 06904

29 June 73 to 2 Oct 73

$12,630

This modification provides for the acquisition of two 50th percentile hybrid anthropomorphic dummies with specified modifications, without instrumentation.

DOT–HS–065–3–724

DETERMINATION OF MOTOR VEHICLE CHARACTERISTICS AFFECTING DRIVER HANDLING PERFORMANCE

Texas A&M Research Foundation
F.E. Box H
College Station, Texas 77843

29 June 73 to 28 June 74

$224,078

Research will be initiated to identify the more significant vehicle handling and stability performance parameters in maneuvering situations requiring extreme vehicle dynamic performance including the limit of performance in situations which would result in vehicle spin-out and plow-out. The extent to which vehicle drivers use the full capability of the vehicle with regard to vehicle response and feedback characteristics will be determined as assessed. Vehicle parameters will be ranked with regard to handling and stability relative to their importance in the vehicle-driver combinations in accident avoidance maneuvers.

DOT–HS–363–3–756

TRAFFIC RECORDS SYSTEMS TRANSFERABILITY MODEL MASTER PLAN DEVELOPMENT PROJECT

Idaho Traffic Safety Commission
2419 West State Street
Boise, Idaho 83702

29 June 73 to 30 June 74

$55,000

A model traffic records system (TRS) plan will be developed utilizing system transferability. The first phase of the project will include the formulation of a work plan, a survey of TRS practices, review of existing system conceptual designs, and feasibility study; the second phase will be the development of the new system design.

DOT–HS–053–3–725

DEVELOPMENT AND EVALUATION OF AUTOMOBILE CRASH SENSORS

Calspan Corporation
P.O. Box 235
Buffalo, New York 14221

29 June 73 to 30 June 74

$106,392

An evaluation and analysis of post-contact sensing techniques will be conducted. A plan of work and methodology will be developed, and a detailed survey will be conducted of the post-contact sensing of frontal impacts. A comparative analysis of the various sensor concepts will be made. Various performance evaluations will include crash performance, environmental tests, sensor reliability, and sensor cost. The environmental tests will include temperature extremes, shock and vibration, humidity, chemicals, ambient currents, icing, temperature/humidity, and temperature/vibration. The results will be analyzed, and conclusions and recommendations prepared.

DOT–HS–100–3–738

TRAINING STATE AND COMMUNITY INSTRUCTORS IN USE OF NHTSA CURRICULUM PACKAGES; DRIVER IMPROVEMENT ANALYSIS, DRIVER LICENSE EXAMINER-SUPERVISOR AND TRAFFIC RECORD ANALYSIS

Technical Education Research Centers, Inc.
311 West University
Champaign, Illinois 61820

29 June 73 to 29 Mar 74

$155,667

An Instructor Institute will be conducted in conjunction with the publication of each of three new NHTSA course sets; driver improvement analysis, driver license examiner—supervision, and traffic records analysis. The project will provide a 30-hour training course in applied methods and techniques for instructing each course.

DOT–HS–139–1–212

MAILING SERVICE

Goodwill Industries
1218 New Hampshire Avenue, N.W.
Washington, D.C. 20036

29 June 73 to 30 June 74

$10,000

This modification provides for the segregation of incoming mail into appropriate department files, and the insertion of designated matter into envelopes.

DOT–HS–027–3–709

PARTS RETURN PROGRAM

General Environments Corporation
7845 N. Nagle Avenue
Morton Grove, Illinois 60053

29 June 73 to 30 June 74

$141,157.47

A program will be developed to obtain automotive parts that break in normal use or fail by leaking, rubbing, or in other ways, except normal wear. The parts will be from passenger cars and pickup trucks and will include brake, steering, and suspension parts. The program will be built up to a level of 500 participating shops. Data will be catologed and failure patterns identified.

DOT–HS–219–3–708

GENERAL MULTIDISCIPLINARY ACCIDENT STUDY

University of Oklahoma Health Sciences Center
800 Northeast 15th Street, Suite 500
Oklahoma City, Oklahoma 73190

29 June 73 to 30 June 74

$117,500

A research-oriented file of highway fatalities will be established in support of the Alcohol Countermeasures Program. Manually encoded cases of fatal accidents

will be created and previous records will be updated on a monthly basis. Data sources specified are: official enforcement officer's traffic accident reports, driver history files, death certificates, coroner's report, hospital records, and health department records.

DOT–HS–246–3–776

PREDICTING SOCIETAL BENEFITS AND COSTS RESULTING FROM THE IMPLEMENTATION OF TITLE II, PL 92–513—STUDY DESIGN, PHASE I

The Center for the Environment & Man, Inc.
275 Winsor Street
Hartford, Connecticut 06120

29 June 73 to 21 Aug 73

$17,972

A study will be made to provide information on the beneficial and adverse consequences of Title II of the Motor Vehicle Information and Cost Savings Act. The study will predict the nature and extent of specific economic, sociological, environmental, political, safety, and other consequences—both beneficial and adverse—on various affected groups which result from alternative methods of accomplishing the objectives of Title II. The study will identify and describe significant socioeconomic, environmental safety, and other tradeoffs among various alternatives. The study will predict the net societal benefits or losses resulting from the implementation of selective alternative methods.

DOT–HS–369–3–779

PEDESTRIAN COUNTERMEASURES INSTALLATION —CITY OF MIAMI, FLORIDA

Metropolitan Dade County
Department of Traffic & Transportation
Miami, Florida

29 June 73 to 28 Sept 73

$8,385.89

This contract provides for two pedestrian countermeasures consisting of a midblock crosswalk installed in the 500 block of 41st Street in Miami Beach, and a diagonal parking countermeasure at N.W. 10th Street between 2d and 3d Avenues. Both countermeasures will be installed in conformance with the City of Miami's policy on midblock crosswalks and diagonal parking.

DOT–HS–053–3–485

IMPROVEMENTS IN CRASH VICTIM GROSS MOTION SIMULATION

Calspan Corporation
4455 Genesee Street
Buffalo, New York 14221

29 June 72 to 30 Dec 73

$97,996

This modification provides for writing all computer programs in such a way that they are virtually interchangeable between a CDC 6600 and an IBM 360/65 with only one trival effort, demonstrated to be less than one man week, needed to transfer a program from one kind of machine to the other.

DOT–HS–031–3–763

THORACIC MODEL IMPROVEMENT (EXPERIMENTAL TISSUE PROPERITIES)

University of Michigan
Office of Research Administration
Research Administration Building
North Campus
Ann Arbor, Michigan

30 June 73 to 29 June 74

$39,680

Research will be undertaken to obtain mechanical properties, both stress and strain, and rupture strength, for various human tissues that are directly applicable to strain rates that can occur during fatal automobile accidents.

DOT–HS–365–3–758

IDENTIFICATION AND REHABILITATION OF YOUNG PROBLEM DRINKER DRIVERS

Lincoln Probation Services, Inc.
County City Building
555 South 10th Street
Lincoln, Nebraska 68508

30 June 73 to 29 June 74

$44,984

This project will investigate and develop the techniques and tools necessary for the identification of young drinkers who are problem drinkers or who are just initiating heavy drinking patterns. It will handle young drivers referred from the courts for drinking/

driving offenses in a manner which is effective in getting them to recognize their drinking problems, and it will offer alternatives for the drinking behavior which lead to these problems.

DOT–HS–344–3–690

DEVELOPMENT OF IMPROVED INFLATION TECHNIQUES

Rocket Research Corporation
York Center
Redmond, Washington 98052

30 June 73

$426,810

An air cushion restraint system will be developed, based on an improved inflation concept, capable of providing frontal crash protection, over a range of anthropometric sizes and positions, to front seat passengers of standard-size vehicles in crashes up to a severity equivalent to a 50-mph head-on flat barrier impact. A series of full-scale evaluation tests of the resulting system will be performed under specified conditions.

DOT–HS–345–3–691

DEVELOPMENT OF IMPROVED INFLATION TECHNIQUES

Olin Corporation
Energy Systems Division
P.O. Drawer G
East Alton, Illinois

30 June 73 to 15 Mar 75

$363,624

An air cushion restraint system will be developed, based on an improved inflation concept, capable of providing frontal crash protection, over a range of anthropometric sizes and positions, to front seat passengers of standard-size vehicles in crashes up to a severity equivalent to a 50-mph head-on flat barrier impact. A series of full-scale evaluation tests of the resulting system will be performed under specified conditions.

DOT–HS–201–3–766

RECREATIONAL VEHICLE ACCIDENT INVESTIGATION STUDY

University of Kentucky Research Foundation
East Wing, Kinkead Hall
Lexington, Kentucky 40506

30 June 73 to 30 June 75

$284,950

A study will be made to determine the frequency and relative severity of recreational vehicle accidents; identify over-represented driver groups, vehicle types, highway conditions, and accident types; develop accident and exposure data; provide for an accounting of potential precrash influencing factors; provide for an accounting of potential injury producing agents; provide for an accounting of the presence of crash and postcrash phenomena; and study the human, vehicular, and environmental elements involved for a selected sub-set of accidents in order to establish the range of potential factors influencing the cause and severity of these accidents.

DOT–HS–010–1–176

AIR BAG EQUIPPED FLEET TEST VEHICLES

University of Southern California
University Park
Los Angeles, California 90007

30 June 73 to 28 July 74

$130,596

This modification provides for the performance of on-site, in-depth investigations at the rate of 40 accidents per year, phasing in new model year vehicles as accidents involving new vehicles occur.

DOT–HS–060–3–671

SINGLE VEHICLE ACCIDENT INVESTIGATION STUDY

University of Miami
Coral Gables, Flordia 33124

30 June 73 to 30 June 75

$229,882

A study will be made to determine the causal factors of single vehicle accidents; to determine the human, vehicular, and environmental elements involved; to determine the at-crash environmental and vehicular factors; to evaluate the probable effects of MVSS

and HSPS relevant to single vehicle accidents; and to recommend conclusive countermeasures which can be implemented and which will reduce the rate and severity of single vehicle accidents.

DOT–HS–031–3–754

THE EFFECTS OF LOWER LEGAL DRINKING AGES ON YOUTH CRASH INVOLVEMENT

University of Michigan
Office of Research Administration
Research Administration Building, North Campus
Ann Arbor, Michigan 48105

30 June 73 to 31 Dec 73

$44,735

A study will be made to determine the magnitude of the youth/alcohol crash problem relative to the youth non-alcohol crash problem; and relative to the adult/alcohol crash problem. The study also will be made to determine the effect of lowering the legal drinking age on crashes involving youth. Existing data will be identified, obtained, and analyzed.

DOT–HS–354–3–716

PILOT DIAGNOSTIC INSPECTION DEMONSTRATION PROJECT

District of Columbia
Department of Motor Vehicles
301 C Street, N.W.
Washington, D.C.

30 June 73 to 30 June 74

$1,400,000

Five to ten diagnostic demonstration projects will be operated to determine the feasibility of using diagnostic techniques in a practical inspection environment. An evaluation plan will be developed and an evaluation program conducted. Two inspection lanes will be converted to include a diagnostic capability. The initial effort will concentrate on safety-related items, but may be expanded to other items later.

DOT–HS–105–3–697

FINITE ELEMENT STRUCTURAL ANALYSIS OF SHEET METAL IN VEHICLE-PEDESTRIAN AND VEHICLE-VEHICLE COLLISIONS

IIT Research Institute
10 West 35th Street
Chicago, Illinois 60690

30 June 73 to 29 June 75

$115,086

Analytical techniques will be developed for predicting vehicular sheet metal response during vehicle-barrier, vehicle-vehicle, and vehicle-pedestrian collisions. An objective is to extend the current status of thin-shell analysis subjected to arbitrary dynamic loading, and then extend it to plastic strains and large deformation regimes. The newly developed tool will be used to study the dynamic responses of sheet metal structures in a vehicle subjected to loading distribution and rate typical of vehicle-pedestrian collision, and of intervehicular collisions.

DOT–HS–243–2–424

THORACIC IMPACT INJURY MECHANISM

Franklin Institute
Benjamin Franklin Parkway
Philadelphia, Pennsylvania 19103

30 June 73 to 31 July 74

$207,772

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chest model
monkey and human scaling validations; experimentation validation of the neck model; and simulation of cadaver experiments.

DOT–HS–031–3–765

BRAKING EFFICIENCY TEST TECHNIQUE

The Regents of the University of Michigan
260 Research Administration Building
Ann Arbor, Michigan 48105

30 June 73 to 30 Sept 74

$107,190

A technique will be developed, and supporting tests procedures developed to determine the braking efficiency of motor vehicles. The technique and procedures will be applicable to passenger cars, multipurpose passenger vehicles, trucks, buses, tractor/trailers, and motorcycles. The technique and procedures will be general in application with regard to vehicle velocity, tire-road coefficient of friction, tire types, and vehicle loading. Technique and procedures will be practical, accurate, and repeatable.

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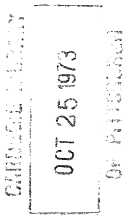

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